Scion 400 Series GC Control Driver User Guide

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Introduction

General

This document describes the configuration of the Scion/Bruker/Varian 400 Series GC control driver (models; 450 GC, 451 GC, 436 GC and 456 GC). It also explains how to build a control method for this driver, how to start and view a running acquisition, and what actions are available during an analysis.

Installation and Configuration

Installing the Driver Software

To install the CompassCDS Drivers software, refer to the CompassCDS Installation Guide.

Configuring the GC Communications

Ethernet Communications

The 400 Series GC uses Ethernet® as the method of communications for instrument control.

The 400 Series GC uses TCP/IP (Transmission Control Protocol / Internet Protocol) to communicate over the Ethernet network and needs to be given a unique IP address to identify the instrument.

A BOOTP Server can be used to assign IP addresses but the recommended procedure is to assign a static IP address in the GC.

To know how to configure the BOOTP server, refer to the CompassCDS installation Guide.

NOTE: The BOOTP server provided by CompassCDS is installed during the installation of the CompassCDS software.

Configuring the Driver

The driver software configuration is done in the CompassCDS Configuration Manager when a new chromatographic system is created.

Configuring the 400 Series GC

Click on the button corresponding to the 400 Series GC driver and the GC configuration screen appears.

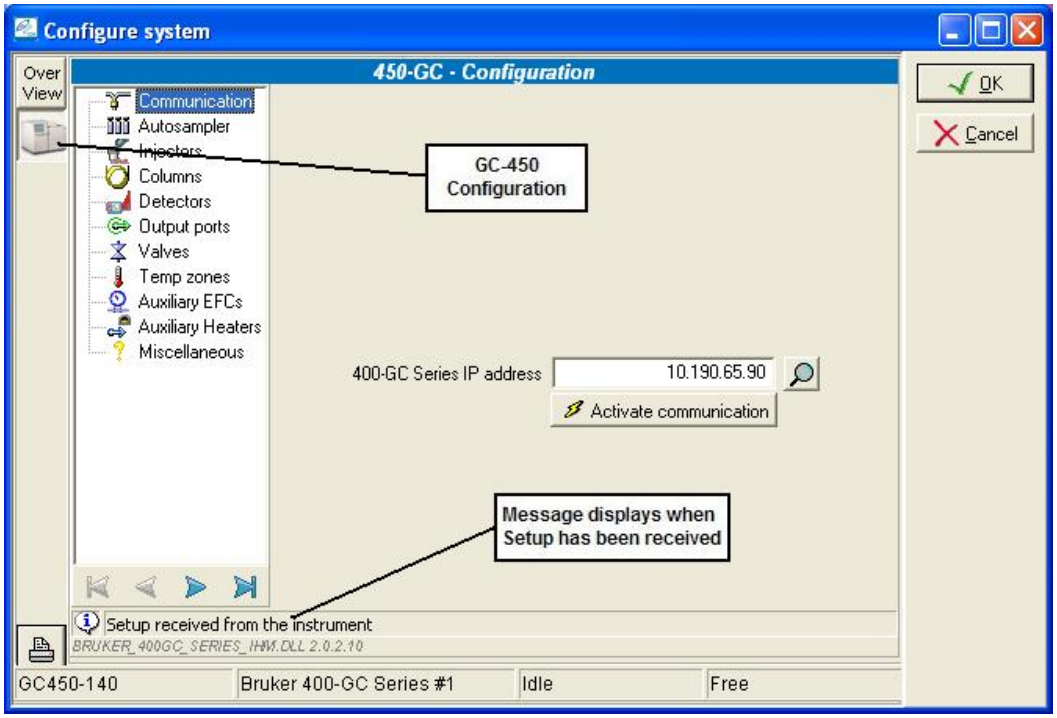
The toolbar allows you to easily scroll through the configuration windows:

to select the first configuration window.

to select the previous configuration window.

to select the next configuration window.

to select the final configuration window.



Select the **Communication** sub-section and enter the IP address of the 400 Series GC (configured in the BOOTP server) or click on the button to find the instrument previously configured with the BOOTP server program and select it.

Press the

button to automatically get the configuration from the instrument.

As soon as the configuration of the instrument is received the name of the instrument type 450/451/436/456-GC is displayed in the title of each driver window (configuration, method and status).

Select the following sub-sections to see the corresponding module configurations (the screens displayed are read-only screens):

Autosampler: displays the autosampler type if installed, the autosampler position, the number of injection ports, the syringe volume or type.

Injectors: displays, for each injector identified by its location (Front, Middle, Rear), the injector type, the installed temperature zone, the associated injector EFC type if installed, the outlet pressure, the pressure display units, the splitless vent flow, the gas saver flow, the gas saver timeout, the column septum purge head pressure and the septum purge flow rate.

Columns: displays whether the column is installed or not (the location -Front, Middle, or Rear- refers to the sample introduction device to which the column is connected), the corresponding temperature zone and the column parameters, which include the carrier gas, the capillary column length and ID (Inside Diameter). If a packed column is used, then 0 is set for length and ID. The carrier gas and column dimension information is used for EFC calculations. Also the pressure units are displayed. The pressure units can be changed to psi, kPa or bar for each position. This setting

converts the pressure values of the injector EFCs in the status and method screen of CompassCDS to the preferred unit.

Detectors: displays the detector type for each location (Front, Middle, Rear), the corresponding temperature zone, the corresponding EFC type if installed, channel 1, 2, 3 gas types according to the installed EFC, and the supported detector frequencies.

Valves: displays the name of the installed valves. Seven internal events and eight external events (using an option board) are available on the 400 Series GC. When a name has been chosen in the instrument setup, this also defines the default states of the valve. These states will be visible when the valve is being programmed in the valve control section of the 400 Series GC method.

Temp zones: displays the six available heated zones on the 400 Series GC and the column oven heated zone. All zones have temperature programming capability and three (Coolable zones 1 - 3) have cryogenic cooling capability. Typically, Coolable zones 1 - 3 are assigned to injectors and Heat-only zones 4 - 6 to detectors.

Auxiliary EFCs: displays added auxiliary EFCs. EFCs can be placed in front, middle and rear position.

Auxiliary Heaters: displays added auxiliary heaters.

Miscellaneous: displays all kind off instrument version information.

NOTE: If you want to modify the GC configuration, you need to use the Setup button directly on the instrument front panel. The 400 Series GC is configured at the factory, and you need to enter Setup only when hardware is being installed such as a column or a field upgrade is done or an option is removed. Refer to the instrument manual for more details.

Configuring the Synopsis

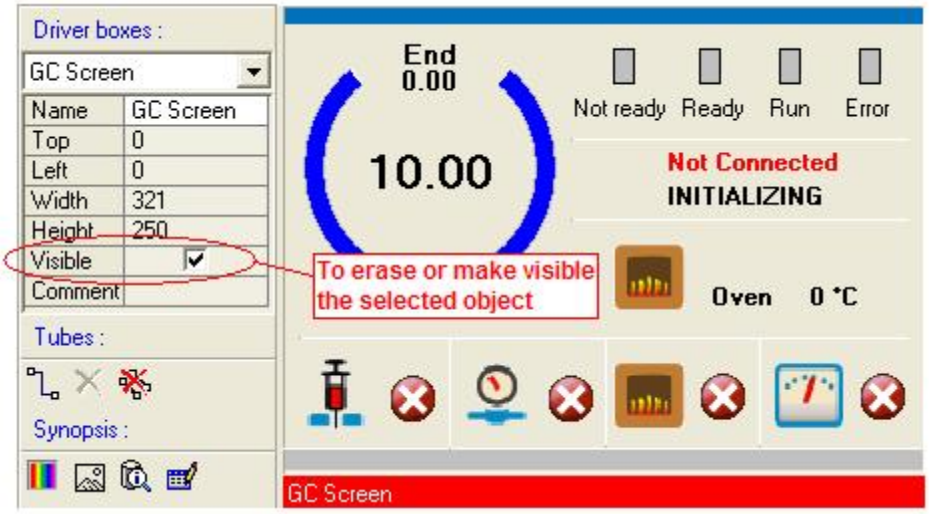
In the *Overview* part of the system configuration, a synopsis can be defined for the system. This synopsis depends on the configured devices.

1. To save the configuration of these devices, click on the *OK* button.
2. Right click on the system name in the bottom part of the ***CompassCDS Configuration Manager*** screen. A pop-up menu appears: click on *Stop.* Then right click on the system name again, and click on *Start*.

1. Go back to the System Configuration screen (***Properties*** wizard). A graphic of the devices that comprise the system is displayed in the synopsis screen. To configure the synopsis as the real instrument configuration, move each module, then connect it appropriately. To do this, select one anchor for each of the two modules (the selected anchors become red) and click on the button; a connection tube will appear between the two anchors.

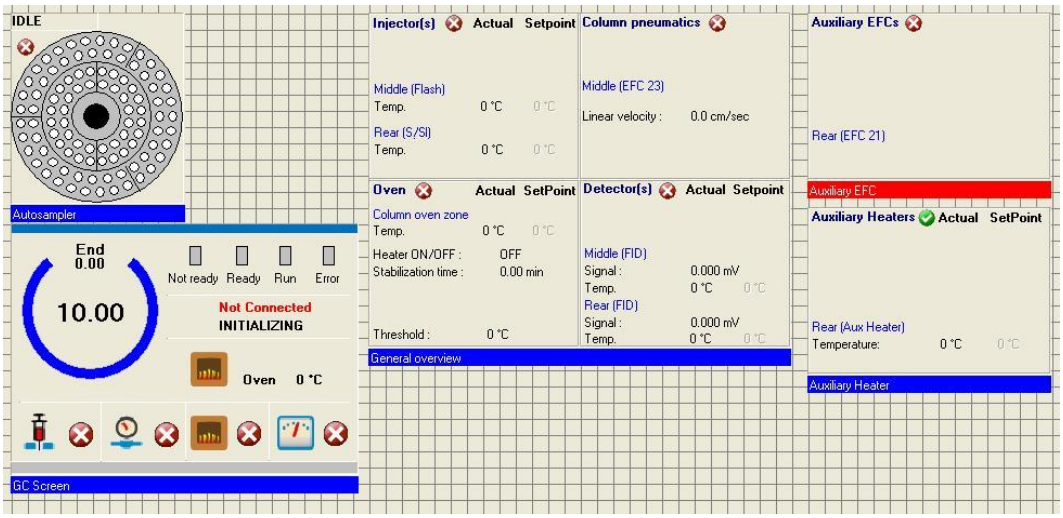
2. Click on the to delete a selected tube, click on the button to delete all the tubes. Click on to define a background color, or on to make the background transparent. Click on the icon to change the grid color.

3. You can choose which screen will be visible or not if you consider that some screen should not be displayed on the Overview: just check or uncheck the Visible box



1. Once the synopsis configuration is complete, it will be displayed in CompassCDS in the *Systems* tab. In this tab, the *Overview* part will show the synopsis of the system with some parameters displayed (temperature, flow, signal, etc.) depending on the installed devices.

2. For example, the following pictures represent the synopsis of the 400 Series GC:



CompassCDS Configuration Manager screen

CompassCDS Chromatography Data System screen

NOTE: Once the system has been created and correctly configured, it must be associated with one or more projects in order to start some acquisitions. For more details about the creation and configuration of a system, refer to the CompassCDS Configuration Manager User Guide.

Click on the button to print the current configuration.

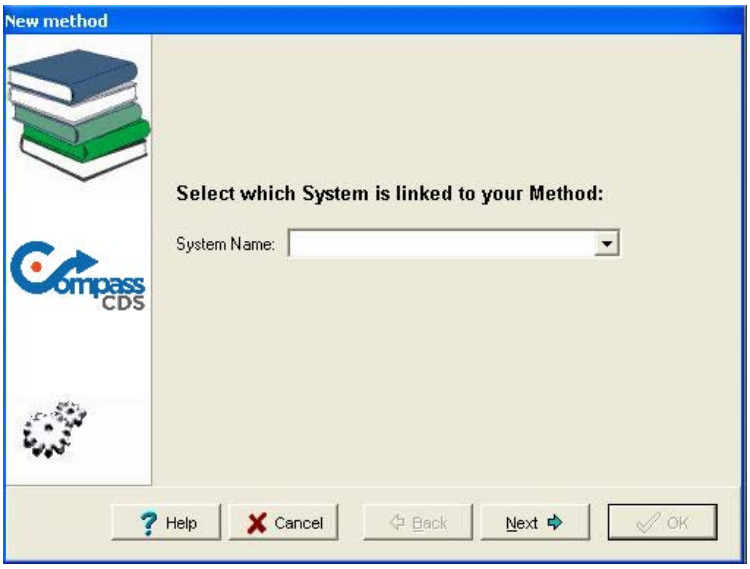
Building a Method

Creating a New Method

The method contains parameters for instrument control, data acquisition, chromatogram processing, and editing of final results. To initially set up a method, it is not necessary to define all of the sub-method sections; however, you must fill in the instrument section prior to starting an acquisition.

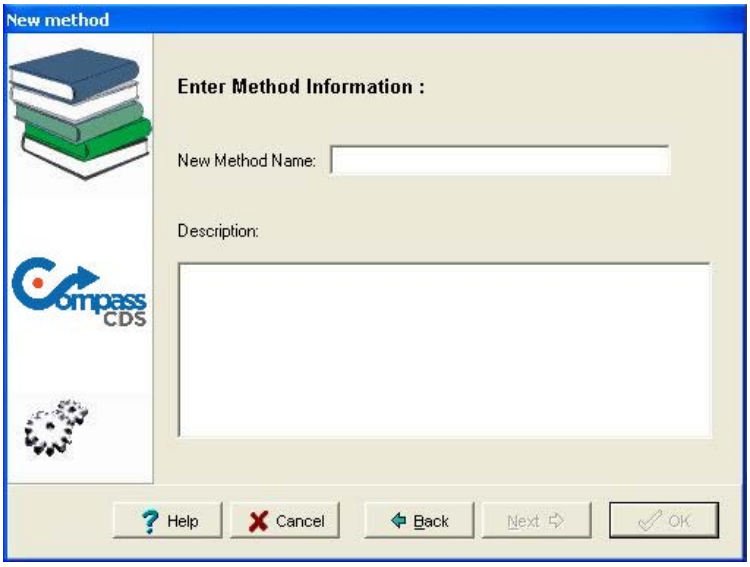
1. To create a new method, select the ***FILE / NEW METHOD*** option from the CompassCDS main menu.

   A wizard guide will appear and provide assistance during the first steps of method creation:



2. Choose the system (chromatograph) associated with the method. A method is created for a particular system. When starting an acquisition, the name of the system that performs the acquisition must be correct, since method access is limited only to those methods associated with this system.

3. Once this field is completed, click on the *Next* button to move to the second step of the method creation:



4. Enter the *New Method Name* in the first field. In the *Description* field, enter information concerning the method (optional).

5. Once these two fields have been completed, click on the *OK* button. The new method is created and is opened with default parameters in CompassCDS. The next step is the definition of each of the method sections.

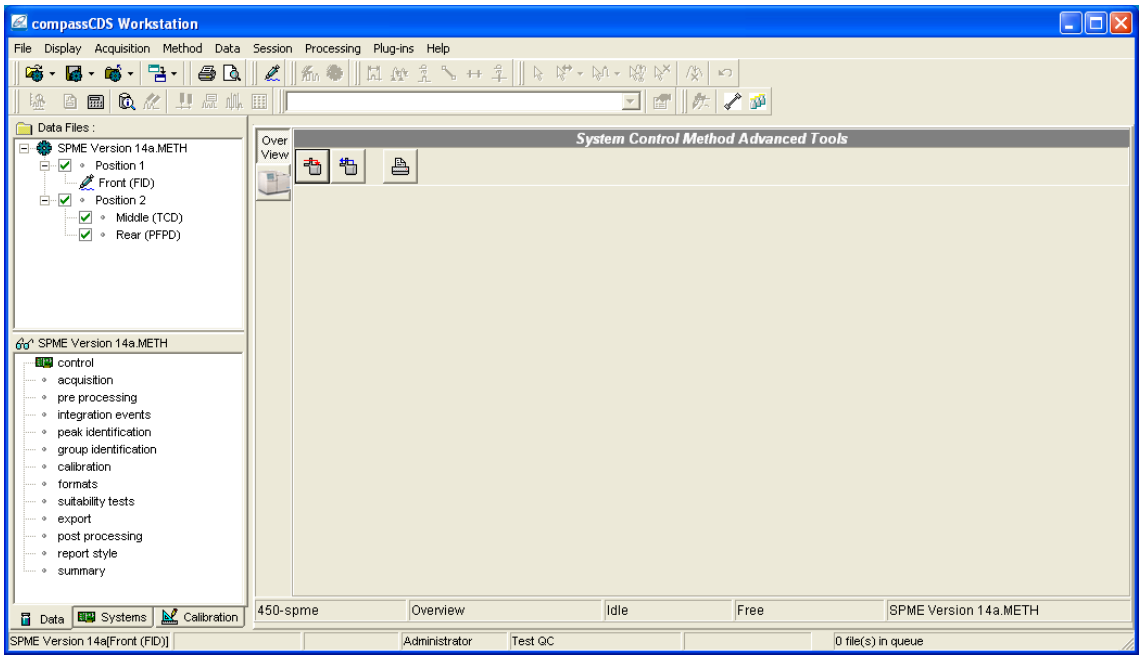
The instrument *control* section must be defined in order to start an acquisition. In the following part of this guide, only the control section for the 400 Series GC is detailed. Other parameters such as *Injection Volume*, *Vial* and *Rack* number may be necessary and are defined in the *acquisition* section.

NOTE: For more details about the programming of each method section, refer to the CompassCDS User Guide.

Control Method Section for the 400 Series GC

Once the new method is created, select the control section in the lower part of the browser.

The following screen appears:



Press the Over View button to display the ***System Control Method Advanced Tools*** window:

To send the current method to the instrument.

To get the active method from the instrument.

To print the current method.

Click on the button to display the 400 Series GC control method section. It contains eight sub-sections: *Autosampler*, *Injectors*, *Column oven*, *Column pneumatics*, *Detectors*, *Output ports*, *Valves*, and *Miscellaneous*. Click on the required sub-section to define the corresponding parameters that will be used during the chromatographic run.

The toolbar allows you to easily scroll through the control method windows:

to select the first window of the control method.

to move back to the previous window of the control method.

to move forward to the next window of the control method.

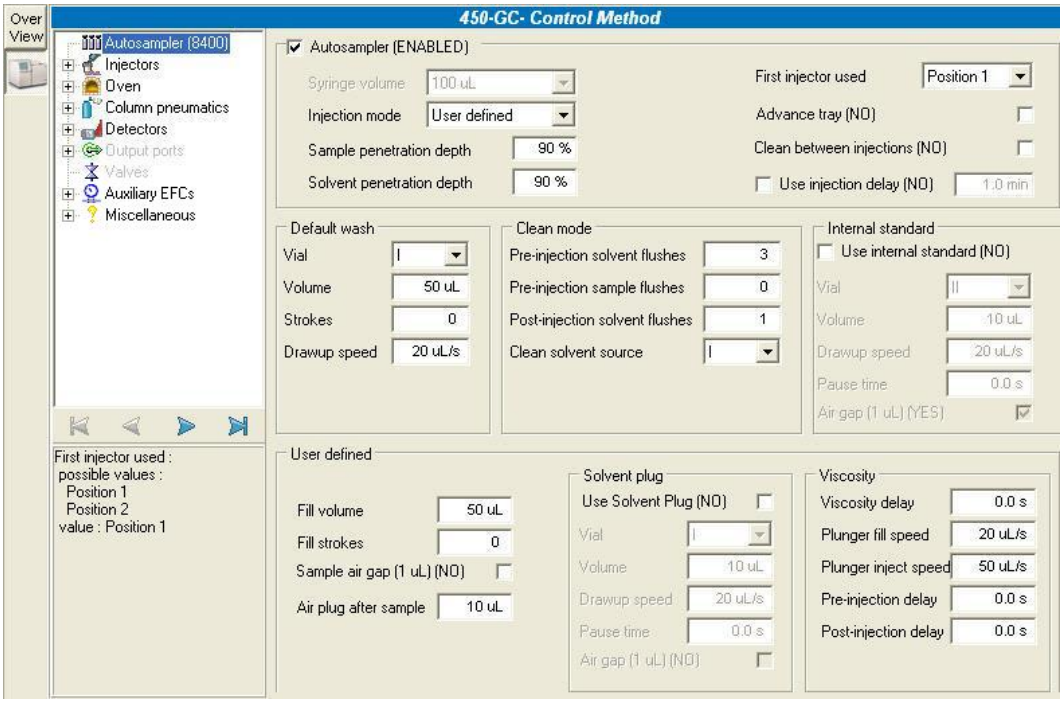
to select the final window of the control method.

NOTE: The browser always displays the current end time of the column oven program. If you enter program end times for components other than the column oven that exceed the column oven end time, a warning message will be displayed. The column oven end time determines the method end time. As a consequence, when the method is downloaded to the GC, component program end times that exceed the column oven end time will be truncated.

AutoSampler Control

The AutoSampler window contains sampling parameters for the 8400/8410 AutoSampler when attached to the 400 Series GC:

Liquid Mode



Autosampler parameter group

In this parameter group, the sampling syringe size (in read only mode, the value displayed corresponds to the one defined in the instrument), the penetration depth for sample and solvent wash vials, the injection mode, and injector position.

Dual and Duplicate injections using the 400 Series GC with two injectors, the 8400/8410 AutoSampler and CompassCDS.

The CompassCDS software will support the 8400 Dual and Duplicate modes of operation on the 400 Series GC appropriately equipped with two injectors. Dual injection mode allows an operator to inject samples from two adjacent vials into both a front and back injector that lies on the arc of the 8400/8410 tower. Duplicate mode injections allow an operator to inject from the same vial into both injectors as described above. To use these features, you must perform certain steps for both the 400 Series GC 8400 setup and for CompassCDS.

Configuring the 400 Series GC 8400/8410

CompassCDS will read the configuration from the GC and will use it to configure itself to either use one injector only or to allow dual and duplicate injections as well as single injections. To configure the 400 Series GC for dual and duplicate injections:

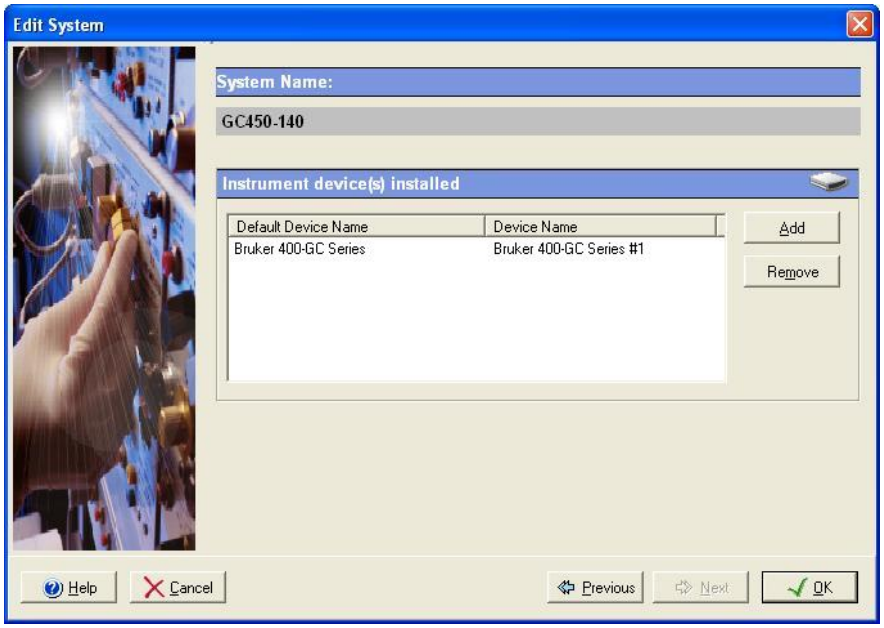
- Press the Setup key on the 400 Series GC keyboard
- Select Edit Instrument Setup
- Select Edit Sample Delivery Parameters
- Set the Sampler Injection Position to Both
- Save and Exit Setup; the 400 Series GC will reboot.

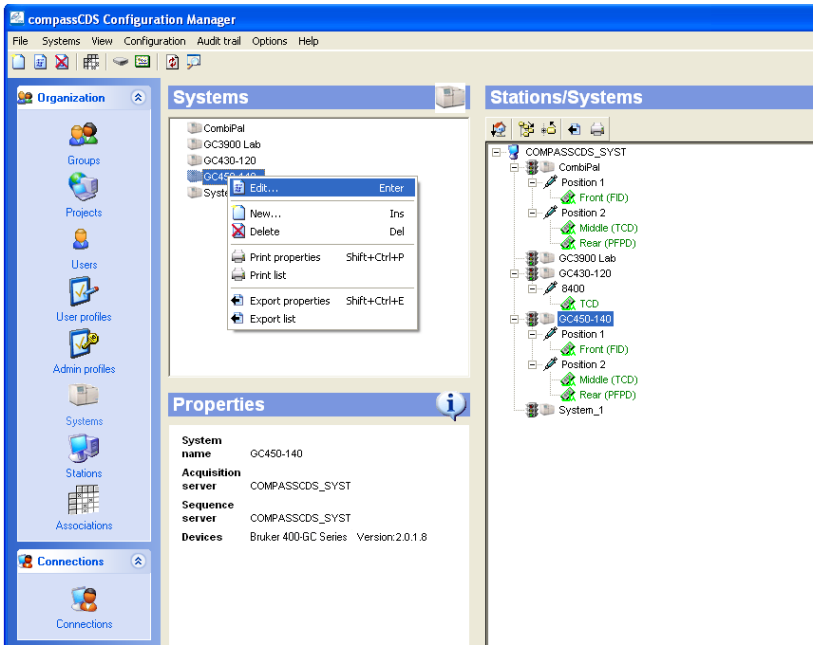
It is assumed that you have calibrated the 8400/8410 for both the front and back injector positions that you will be using. If you have not done this, you should make certain the calibration is done before you start using your system.

Configuring CompassCDS

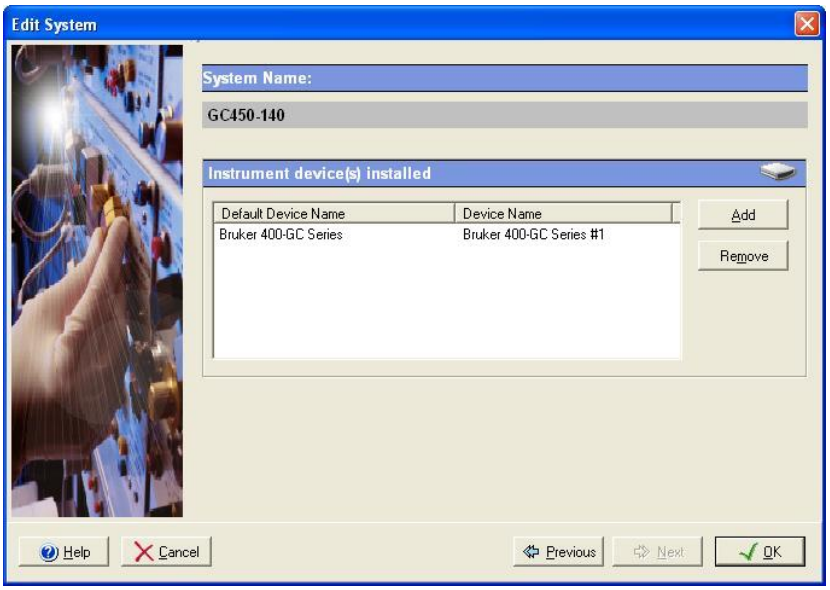
To configure CompassCDS you will first have to add the system you are using if you have not already done so.

Follow the instructions in the CompassCDS Manuals for creating a new system. If you already have a system right-click on the system and choose edit; follow the instructions below.

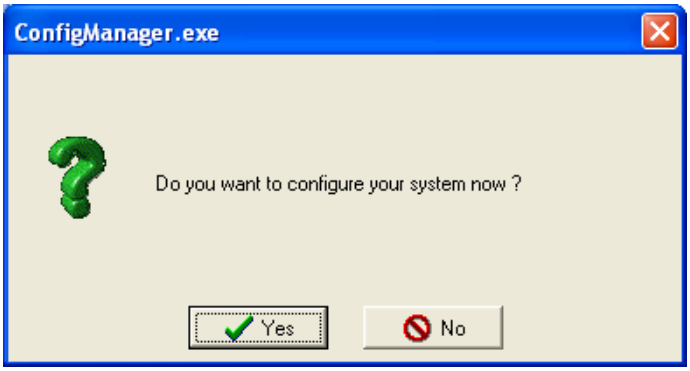




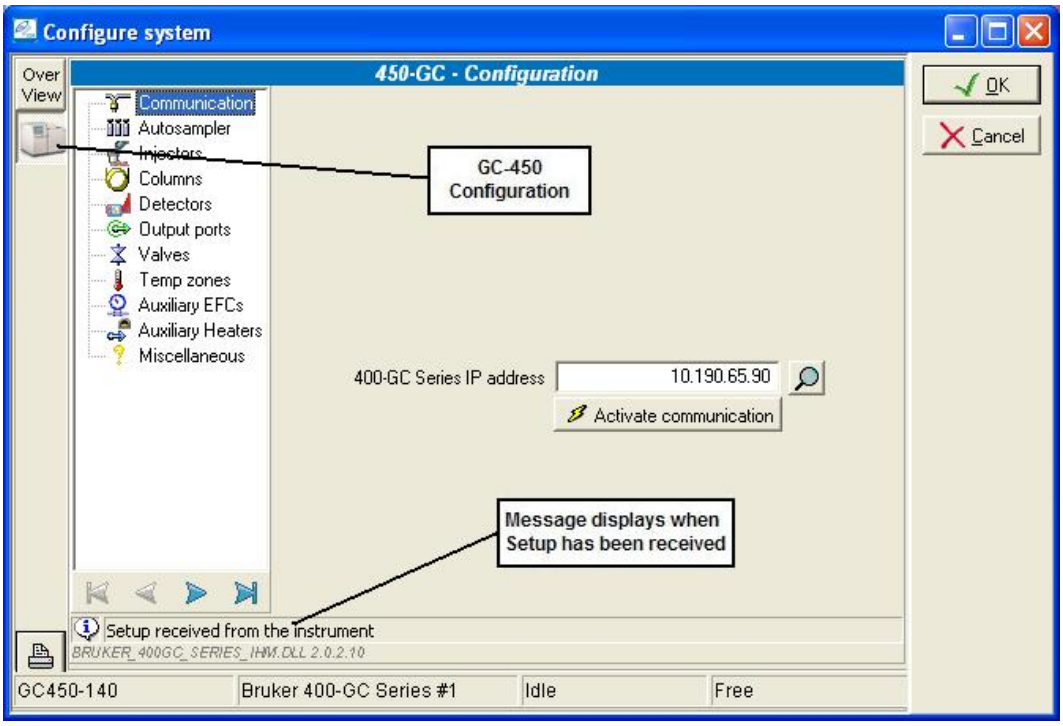
Click on the *Next* button at the bottom of the CompassCDS screens until you obtain the following screen. Click on the *OK* button to configure the system.



The following screen is displayed after you click on *OK*. Click on the *Yes* button.



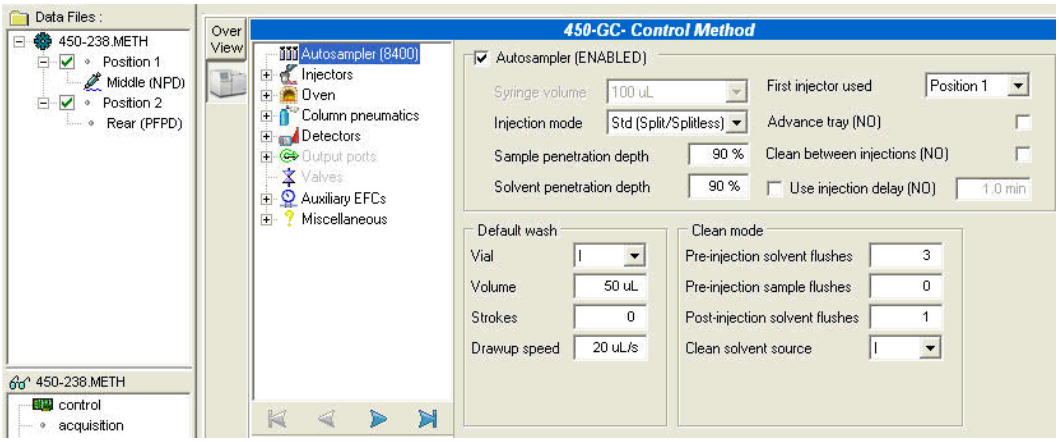
Click on the 400 Series GC Configuration icon and check to make sure that the configuration has been received from the instrument.



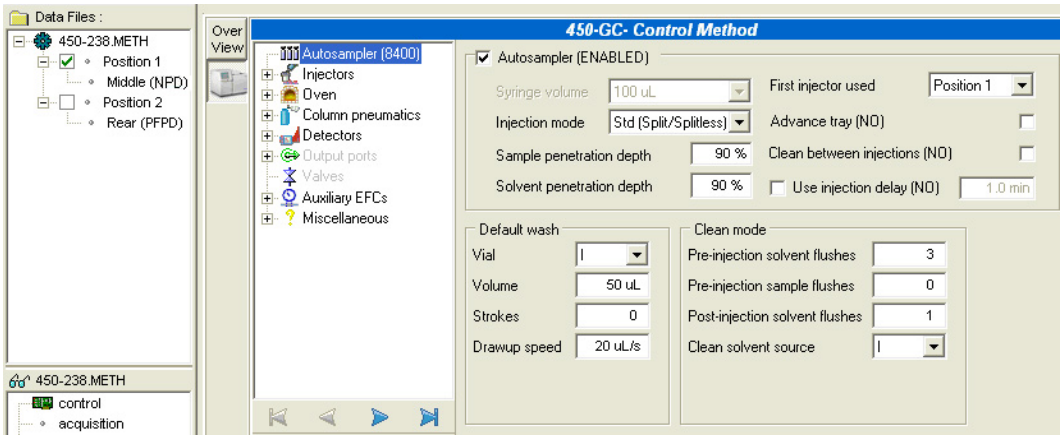
After Setup is uploaded successfully, click on the *OK* button.

You will need to *Start* and *Stop* the instrument before closing the CompassCDS Configuration Manager or before using the system in the CompassCDS software.

After successfully configuring the system in the CompassCDS Configuration Manager, open your instrument in CompassCDS and build a method for it by uploading the method from the instrument. Click on the Data tab at the bottom of the CompassCDS screen and display the method. Click on the AutoSampler selection to show the AutoSampler method. Your screen should look similar to the one displayed below. If you do not see selections for first injector used, Advance tray etc. as displayed in the upper right corner below, then the 400 Series GC is not configured to use both injectors. Go back to the beginning of this document and verify that you have correctly set the 400 Series GC to use both injectors.



Note the left side of the screen above. The expanded tree under the method shows two checkboxes for injectors, front (Position 1) and middle (Position 2). Use these checkboxes to identify which of the two injectors you wish to use in the case that injections into only one injector are required (refer to the CompassCDS manual, *Create a Method* section to see details about the way to use multi-injectors and/or multi-detectors systems).
In the example below the middle injector has been deselected. In this configuration injections will only be made into the front injector.



Refer to the following tables for details about each autosampler parameter.

Parameter	Description
Autosampler	When unchecked, this option allows manual injection and to not use the autosampler (when unchecked, all the sampler parameters become non-active).
Syringe Volume (µL)	Displays the size of the syringe that is installed on the instrument, or the SPME mode. This field is in read only mode.
Injection mode	Consists of five predefined injection modes: Standard Split/Splitless, Standard On-Column, Neat, Viscous and Volatile. A sixth User Defined mode is available and allows you access to all autosampler parameters to fine-tune your injection.
Sample penetration depth (%)	Specifies how far the syringe needle is to go down into the sample vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.
Solvent penetration depth (%)	Specifies how far the syringe needle is to go down into the solvent vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.
First injector used	Corresponds to the injector used for sample injection. If the autosampler is physically mounted in the Front position, position 1 will correspond to the front injector and position 2 will correspond to the middle injector. If the autosampler is physically mounted in the Rear position, position 1 will correspond to the middle injector and position 2 will correspond to the rear injector.
Advance tray	When checked, this option allows injection from two successive vials in the two injectors (**Dual Injection mode**). When unchecked, the sampler will inject from the same vial in the two injectors (**Duplicate Injection mode**).
Clean between injection	When checked, the sampler will perform a wash program before the injection from the second vial.
Use injection delay	Check this option to define a time delay before the injection from the second vial (note: between two injections, without setting an injection delay, the sampler takes about 0.7 minutes).

NOTE: If opening a method created on a system configured with a syringe volume (X µL), on a system fitted out with a different syringe volume (Y µL), an Update button is displayed near the Syringe Volume field. Clicking on this button will reset all the parameters that depend on the syringe volume to the default actual ones. Moreover, a message is displayed on the bottom of the screen to inform the user that the syringe size has changed

NOTES:

- The standard mode is the default and typically yields good results in most applications.

- The volatile sampling mode is used for sampling solvents with high vapor pressures at room temperature.

- The neat sampling mode is used for pure samples requiring minimum contamination with wash solvent (this mode does not use a solvent plug).

- The viscous sampling mode is used for samples with a higher viscosity than water.

- Enter the same number of vials for each injector (*Vial* field in the *Acquisition* method section). The number of the vial injected is displayed on the run log of the chromatogram (acquisition part)

Default wash parameter group

In the Default wash fields, define the parameters that will be used during the default cleaning, which is used in the case that automation is stopped or a serious fault is detected.

Parameter	Description
Vial	Specifies which of the three solvent vials will be used by the default cleaning.
Volume (µL)	Specifies the amount of cleaning solvent that will be drawn up with each syringe cleaning stroke.
Strokes	Specifies the number of times the cleaning solvent will be drawn up into the syringe and expelled into the waste cup.
Drawup speed (µL/s)	Specifies speed at which the cleaning solvent will be drawn up into the syringe and the speed at which it is expelled into the waste cup.

Clean mode parameter group

In the Clean mode fields, define the pre-injection and post-injection syringe clean modes.

Parameter	Description
Pre-injection solvent flushes	Specifies the number of times each selected cleaning solvent will be drawn up into the syringe and expelled into the waste cup before flushing with next cleaning solvent (if more than one cleaning solvent source is specified) or the sample, before injection.
Pre-injection sample flushes	Specifies the number of times the sample will be drawn up into the syringe and expelled into the waste cup before the syringe is loaded for injection.
Post-injection solvent flushes	Specifies the number of times each selected cleaning solvent will be drawn up into the syringe and expelled into the waste cup before flushing with next cleaning solvent (if more than one cleaning solvent source is specified), after injection.
Clean solvent source	Selects which solvent vial or sequence of solvent vials will be used to flush the syringe before and after injection.

Internal standard parameter group

This parameter group is displayed when one of the following injection modes is selected: Viscous, Volatile, or User-defined.

If the Use internal standard option is checked, an internal standard solution will be drawn up into the syringe from the specified solvent vial before the sample is drawn up.

Parameter	Description
Vial	Selects which solvent vial contains the internal standard.
Volume (µL)	Specifies the amount of internal standard to be drawn into the syringe before the sample.
Drawup speed (µL/s)	Specifies the speed at which the internal standard will be drawn up into the syringe.
Pause time	Defines how long the syringe is to remain in the internal standard vial after drawing up the internal standard.
Air gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap between the internal standard and the sample

NOTE: When this mode of injection is selected, beware that the total volume (volume of sample injected, entered in the Volume field of the Acquisition method section + Volume of internal standard + volume of any air gaps) does not exceed the maximum syringe volume or the autosampler will be faulted and the GC will stay in the Waiting for injection state.

User defined parameter group

When the User defined injection mode has been selected, another parameter group is displayed and allows you to define the general, solvent plug, and viscosity parameters:

User defined parameters

Parameter	Description
Fill volume (µL)	Specifies the sample volume that will be used for each fill stroke.
Fill strokes	Specifies the number of times the sample will be pumped in and out of the syringe before loading the sample volume into the syringe.
Sample air gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap before the sample plug.
Air plug after sample	Specifies the volume of room air that will be drawn into the syringe after it is loaded with sample.

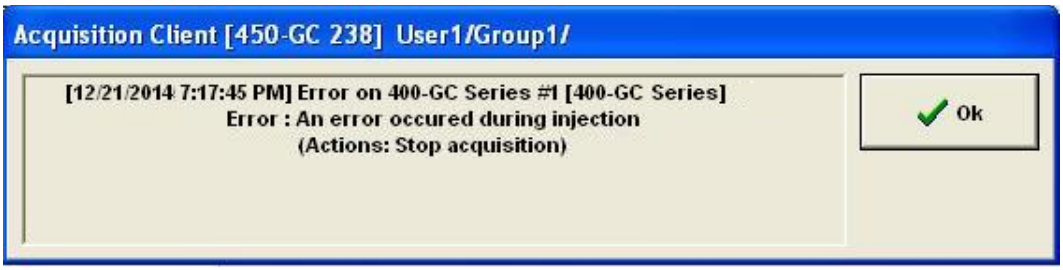
Solvent plug parameters

Parameter	Description
Vial	Selects which solvent vial to use for the solvent plug.
Volume (µL)	Specifies the amount of solvent to be drawn into the syringe before the sample or internal standard.
Drawup speed (µL/s)	Specifies the speed at which the solvent will be drawn up into the syringe.
Pause time	Defines how long the syringe is to remain in the solvent vial after drawing up the solvent.
Air gap	When the option is checked, 1 µL of room air will be drawn into the syringe to create an air gap before the solvent plug.

Viscosity parameters

Parameter	Description
Viscosity delay (sec)	Specifies how long the syringe is to remain in the sample vial after drawing up the sample.
Plunger fill speed (µL/sec)	Specifies the speed at which the sample will be drawn up into the syringe.
Plunger inject speed (µL/sec)	Specifies the speed at which the contents of the syringe will be expelled into the injector.
Pre-injection delay (sec)	Specifies the length of time the syringe needle resides in the injector before expelling the syringe contents.
Post-injection delay (sec)	Specifies the length of time the syringe needle remains in the injector after expelling the syringe contents.

NOTE: When a vial is missing, the following message appears:


Acquisition Client [450-GC 238] User1/Group1/
[12/21/2014 7:17:45 PM] Error on 400-GC Series #1 [400-GC Series]
Error : An error occured during injection
(Actions: Stop acquisition)
Ok

Warning message when a vial is missing.

Default settings for predefined autosampler mode

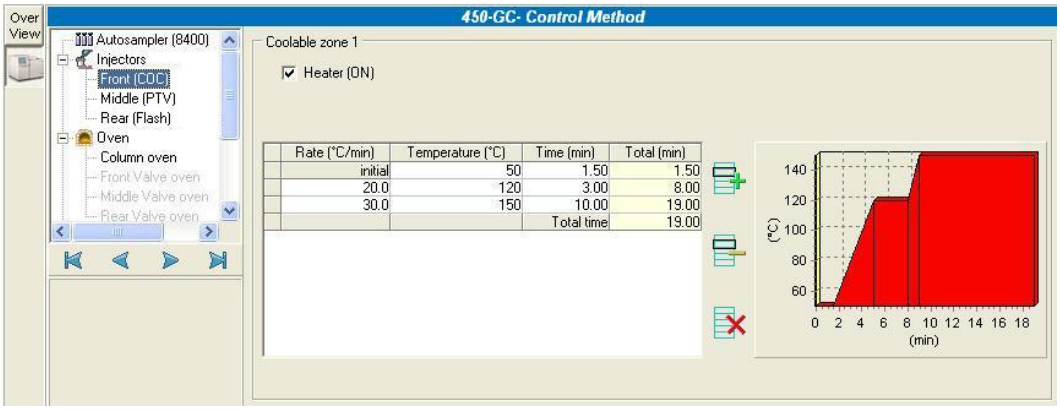
The following table lists the parameter settings used for each of the Predefined 8400/8410 modes using a 10 microliter syringe. If the predefined modes do not work acceptably for your samples, use the User Defined mode to enter settings that will work better with your samples. The values listed in this table provide a starting point for setting the various parameters.

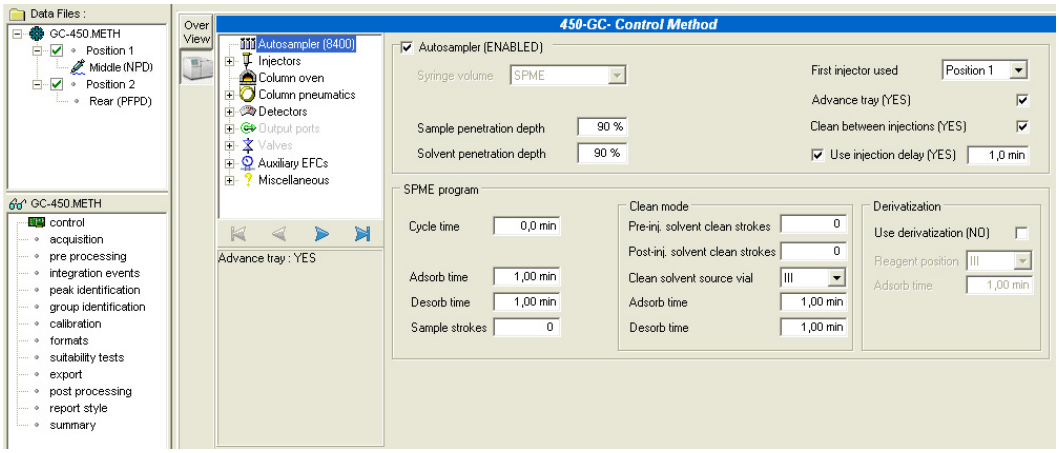
Parameter	Std Split/ Splitless	Std On-Column	Neat [1]	Volatile	Viscous
Solvent Plug Settings:	Solvent plug is not used with predefined modes. If you wish to use solvent plug injections, you must use User Defined mode.				
PreDefined Settings:					
Fill Volume	10.0 µL	10.0 µL	10.0	Not used	Not used
Fill Strokes	5	5	6	0	0
Sample Air Gap	No	No	No	No	No
Air Plug after Sample	1.0 µL	1.0 µL	1.0 µL	1.0 µL	1.0 µL
Viscosity Settings:					
Viscosity Delay	0.0 sec	0.0 sec	0.0 sec	6 sec	9.9 sec
Plunger Fill Speed	2.0 µL/sec	2.0 µL/sec	2.0 µL/sec	1.0 µL/sec	1.0 µL/sec
Plunger Inject Speed	50 µL/sec	2 µL/sec	50 µL/sec	1 µL/sec	5 µL/sec
Pre-Injection Delay	0.0 sec	0.0 sec	0.0 sec	0.0 sec	0.0 sec
Post-Injection Delay	0.0 sec	6.0 sec	0.0 sec	0.0 sec	12.0 sec

[1] Instead of fill strokes, Neat mode fills the syringe with sample at 2 µL/sec then expels it into the waste cup at 50 µL/sec. It does this a total of six times. Then it fills the syringe with sample at 2 µL/sec and expels it back into the sample vial at 50 µL/sec. This “pumping” action is done three times. After this is completed, the sample is loaded into the syringe and injected using the parameters in the table.

SPME Mode

Refer to the following tables to see details about each autosampler parameter.





Parameter	Description
Autosampler	When unchecked, this option allows you to inject manually and to not use the autosampler (when unchecked, all the sampler parameters become non-active).
Sample penetration depth (%)	Specifies how far the syringe needle is to go down into the sample vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.
Solvent penetration depth (%)	Specifies how far the syringe needle is to go down into the solvent vial. 100% corresponds to the bottom of the vial. 0% is the bottom of the vial septum.
First injector used	Corresponds to the injector used for sample injection. If the autosampler is physically mounted in the Front position, position 1 will correspond to the front injector and position 2 will correspond to the middle injector. If the autosampler is physically mounted in the Rear position, position 1 will correspond to the middle injector and position 2 will correspond to the rear injector.
Advance tray	When checked, this option allows injection from two successive vials in the two injectors (**Dual Injection mode**). When unchecked, the sampler will inject from the same vial in the two injectors (**Duplicate Injection mode**).
Clean between injection	When checked, the sampler will perform a wash program before the injection from the second vial.
Use injection delay	Check this option to define a time delay before the injection from the second vial (Note: between two injections, without setting an injection delay, the sampler takes about 0.7 minutes).

NOTE: Enter the same number of vials for each injector (*Vial* field in the *Acquisition* method section). The number of the vial injected is displayed on the run log of the chromatogram (acquisition part).

SPME Program parameter group

In the SPME Program fields, define the parameters that will be used during the SPME.

Parameter	Description
Cycle Time	Specifies the total time of an analysis. This parameter is required only if prep-ahead is used. When using prep-ahead, the prep-vial parameter in the sequence should be set to 2 for this driver.
Adsorb Time	Specifies the time the fiber will stay in the vial.
Desorb Time	Specifies the time the fiber will be exposed in the injector to desorb the sample.
Sample Stroke	Specifies how many times the adsorb time will be repeated before injection.

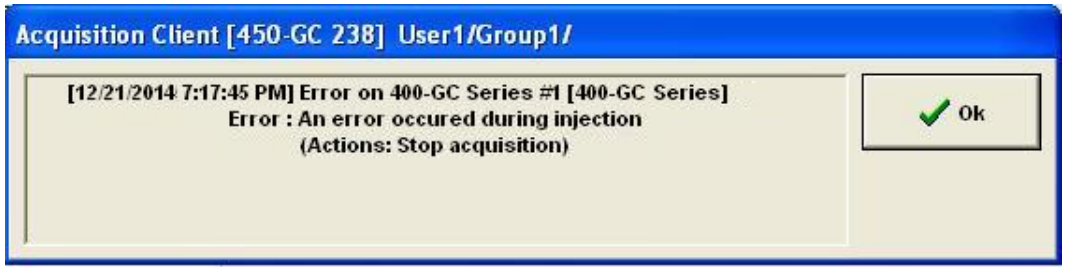
Clean Mode parameters

Parameter	Description
Pre-injection solvent clean strokes	Specifies the number of times the fiber will be cleaned before the injection.
Post-injection solvent clean strokes	Specifies the number of times the fiber will be cleaned after the injection.
Clean solvent source vial	Specifies the clean solvent source vial.
Adsorb time	Specifies the time the fiber will stay in the clean solvent source vial.
Desorb time	Specifies the desorb time during the cleaning cycle.

Derivatization parameters

Parameter	Description
Use derivatization	Specifies if derivatization will be used.
Reagent Position	Specifies the reagent vial.
Adsorb time	Specifies the time the fiber will stay in the reagent vial.

NOTE: When a vial is missing, the following message appears.


Acquisition Client [450-GC 238] User1/Group1/
[12/21/2014 7:17:45 PM] Error on 400-GC Series #1 [400-GC Series]
Error : An error occured during injection
(Actions: Stop acquisition)
Ok

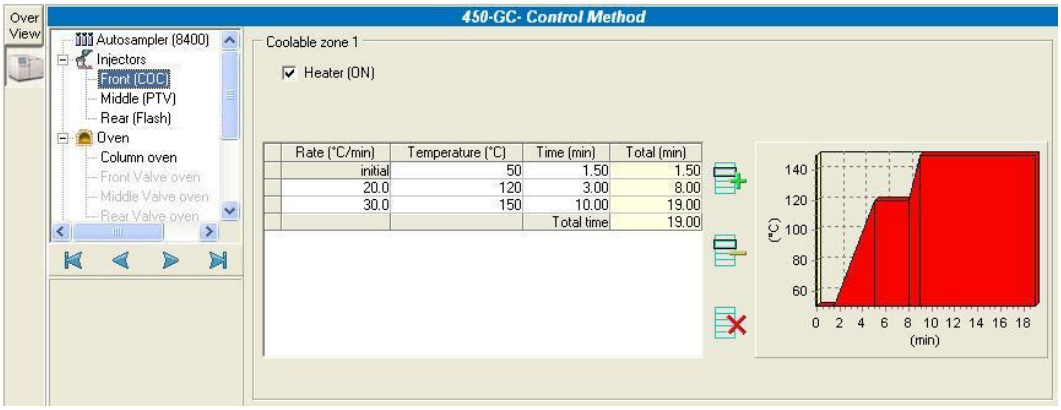
Warning message when a vial is missing.

Injectors Control

The Injectors sub-section contains up to three injectors: Front, Middle, and Rear. Click on the injector you want to edit.

Depending of the system configuration, an injector can be connected to a heat-only zone or to a coolable zone with the coolant activated or not. In these cases, the screens displayed are not exactly the same.

PTV Injector



Coolable zone or Heat-only zone parameter group

Check (or uncheck) the *Heater* option to indicate whether or not you will use the installed injector.

If the injector is connected to a coolable zone and if the coolant is activated, check the *Coolant* option if you want to turn the coolant valve ON when the injector is cooling down. Specify the temperature (°C) for the coolant valve to turn on in the *Enable coolant at* field and the *Coolant timeout*. This parameter provides a safety measure to save coolant after the specified time if the

injector fails to reach its set temperature or the GC does not go into run. The valve will be turned OFF if the coolant timeout is reached and no further coolant will be applied.

Use the table to build a temperature ramp program to heat and/or cool the injector. The first row of the table contains the initial temperature and hold time for the injector. The injector will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final temperature of each ramp segment in the *Step* column, the *Rate (°C/min)* and the *Time* the inlet heater is held at this temperature in the corresponding columns.

NOTE: The graph shows the inlet temperature programming.

Split event table parameter group

If the injector is connected to a Type 21 EFC, you can build a split ratio time program by using the split event table.

The first row of the table contains the *Initial Split state* and *Split ratio* for the injector. The injector will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed.

The rest of the table contains the time-programmed settings for the injector *Split ratio.* The split valve will be switched to the ratio in each row at the indicated time. If the *Split state* is ON, then the sample is split according to the split ratio specified in the corresponding column. If the state is OFF, all the sample enters the column. The split ratio is defined as the column flow plus the split flow, divided by the column flow.

NOTE:
- You must have already configured the Type 21 EFC in the CompassCDS Configuration Manager before you can program the split ratio. Specifically, to build a PTV Split Ratio Program, a Front PTV must have a corresponding Front Type 21 EFC, a Middle PTV must have a corresponding Middle Type 21 EFC, and a Rear PTV must have a corresponding Rear Type 21 EFC.

- You can use a split ratio of 100 after injection to vent the injector of any residual solvent.

- Use a very low split ratio after flushing to conserve carrier gas.

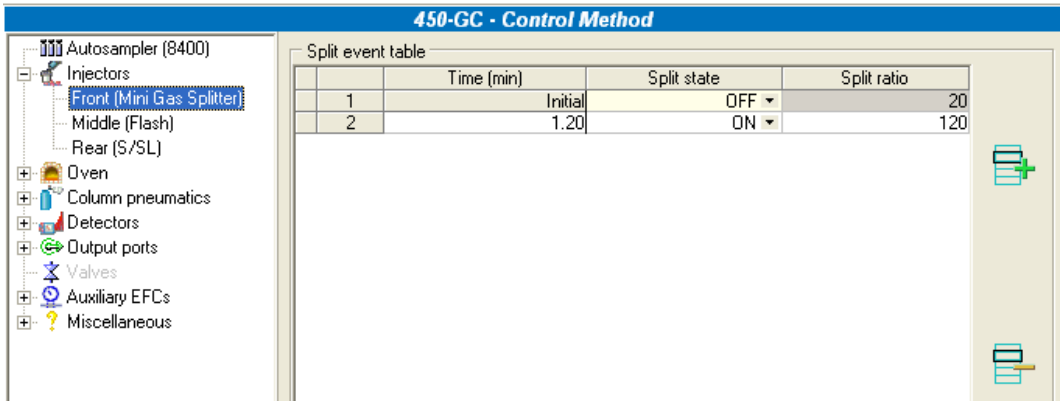
Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

Mini Gas Splitter



Split event table parameter group

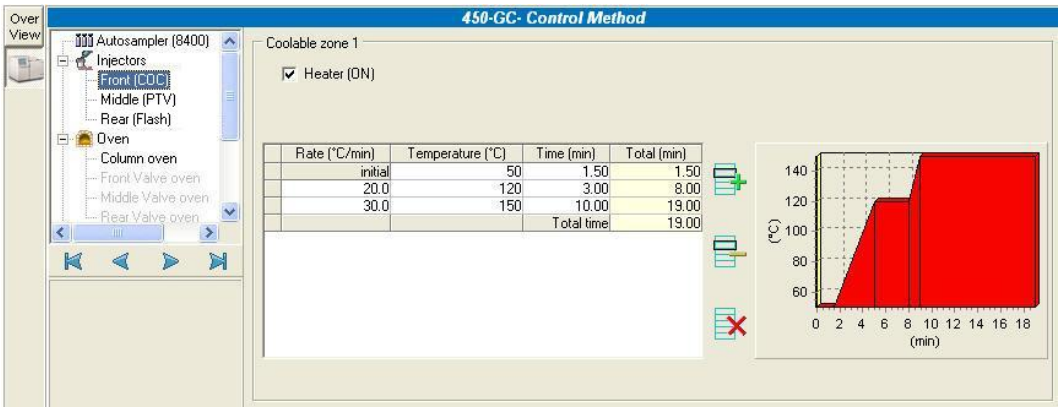
If the injector is connected to a Type 21/25 EFC, you can build a split ratio time program by using the split event table (refer to the PTV injector for more details).

to add a line to the table.

to delete a line in the table.

to clear the entire table.

COC Injector



Coolable zone parameter group

Check (or uncheck) the *Heater* option to indicate whether or not you will use the installed injector.

If the injector is connected to a coolable zone and if the coolant is activated, check the *Coolant* option if you want to turn the coolant valve ON when the injector is cooling down. Specify the temperature (°C) for the coolant valve to turn on in the *Enable coolant at* field and the *Coolant timeout*. This parameter provides a safety measure to save coolant after the specified time if the injector fails to reach its set temperature or the GC does not go into run. The valve will be turned OFF if the coolant timeout is reached and no further coolant will be applied.

Use the table to build a temperature ramp program to heat and/or cool the injector. The first row of the table contains the initial temperature and hold time for the injector. The injector will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final temperature of each ramp segment in the *Step* column, the *Rate (°C/min)* and the *Time* the inlet heater is held at this temperature in the corresponding columns.

NOTE: The graph shows the inlet temperature programming.

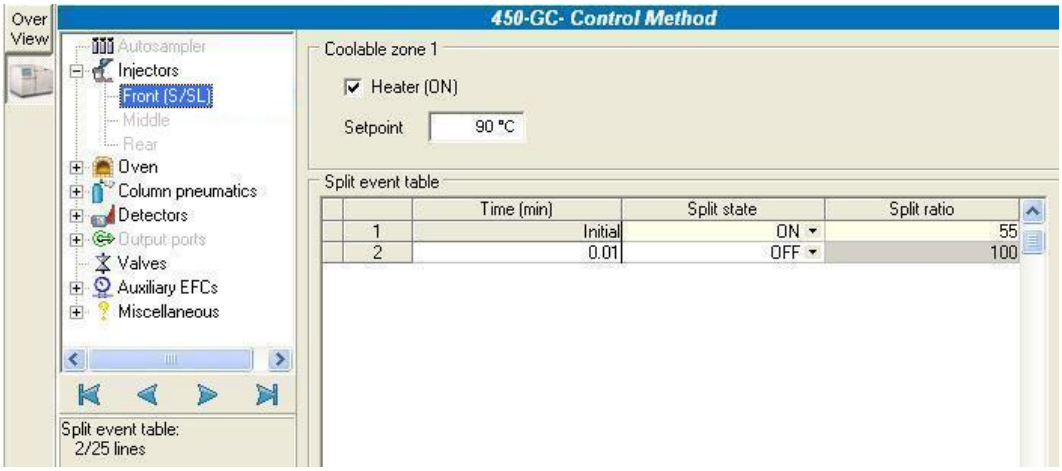
Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

S/SL Injector



Coolable zone or Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the injector oven ON or OFF.

Enter the injector oven temperature in the *Setpoint* field.

Split event table parameter group

If the injector is connected to a Type 21 EFC, you can build a split ratio time program by using the split event table (refer to the PTV injector for more details).

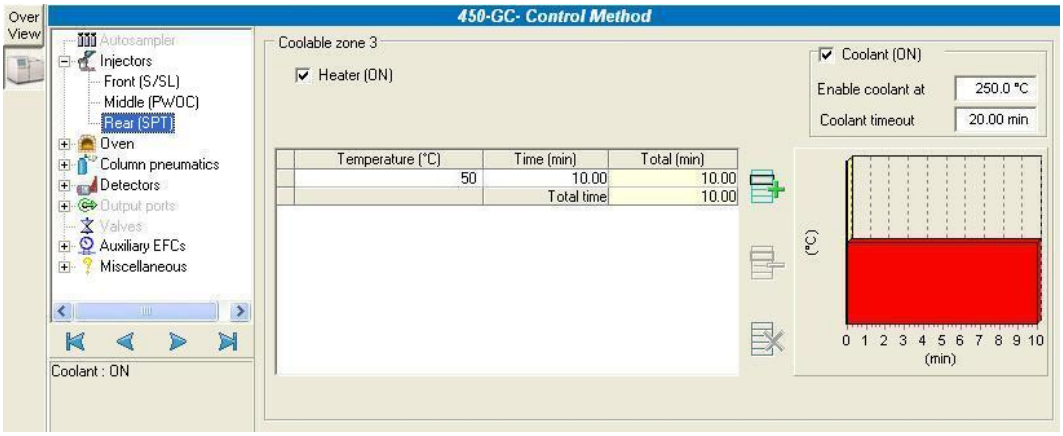
PWOC injector / FLASH injector

Coolable zone or Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the injector oven ON or OFF.

Enter the injector oven temperature in the *Setpoint* field.

SPT injector (Sample Preconcentration Trap)



Coolable zone parameter group

Check (or uncheck) the *Heater* option to turn the injector oven ON or OFF.

The SPT must be connected to coolable zone 3. If the coolant is activated, check the *Coolant* option if you want to turn the coolant valve ON when the injector is cooling down. Specify the temperature (°C) for the coolant valve to turn on in the *Enable coolant at* field and the *Coolant timeout*. This parameter provides a safety measure to save coolant after the specified time if the injector fails to reach its set temperature or the GC does not go into run. The valve will be turned OFF if the coolant timeout is reached and no further coolant will be applied.

Use the table to build a temperature program to heat and/or cool the injector.

Enter the final temperature of each segment in the *Step* column and the *Time* the inlet heater is held at this temperature in the corresponding column.

Use the following buttons to edit the table:

to add a line to the table.

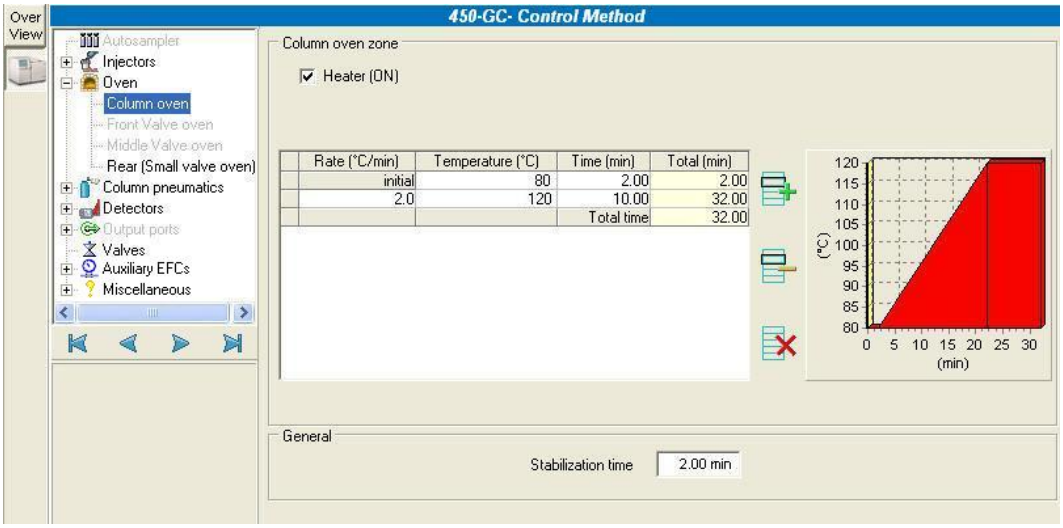
to delete a line in the table.

to clear the entire table.

NOTE: The graph shows the inlet temperature program.

Column Oven Control

The Column oven window contains the column oven program:



Column oven zone parameter group

Check the *Coolant* option if you want to turn the column coolant valve ON. Specify the temperature (°C) for the coolant valve to turn on in the *Enable coolant at* field and the *Coolant timeout*. This parameter provides a safety measure to save coolant after the specified time if the column oven fails to reach its set temperature or the GC does not go into run. The valve will be turned OFF if the coolant timeout is reached and no further coolant will be applied.

Use the table to build a temperature ramp program to heat and/or cool the column oven.

The first row of the table contains the Initial temperature and hold time for the column oven. The column oven will equilibrate to this setting and stabilize for the specified *Stabilization time* (defined in the **General** parameter group), when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final temperature of each ramp segment in the *Step* column, the *Rate (°C/min)* and the *Time* the column oven is held at this temperature in the corresponding columns.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

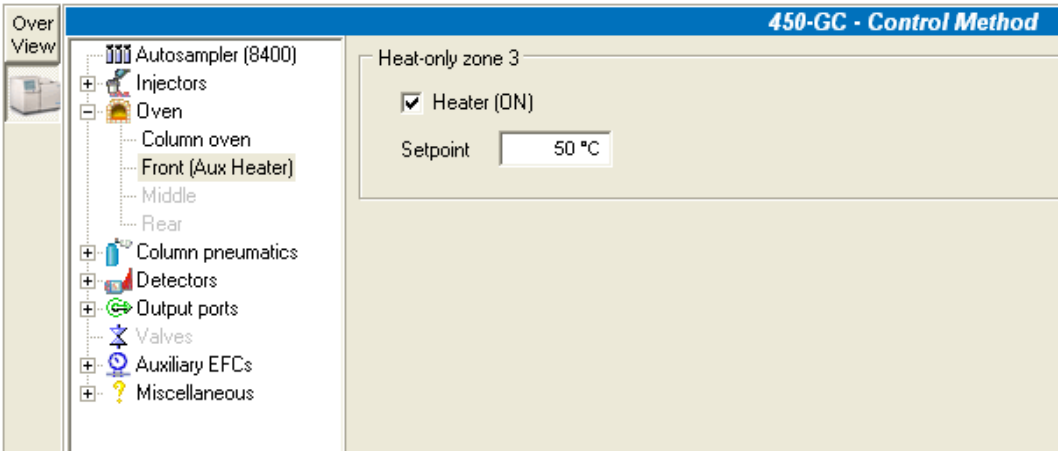
NOTE: The graph shows the column oven temperature program.

General parameter group

Enter the *Stabilization time* in the corresponding field.

NOTE: The browser always displays the current end time of the column oven program. If you enter program end times for components other than the column oven that exceed the column oven end time, a warning message will be displayed. The column oven end time determines the method end time. As a consequence, when the method is downloaded to the GC, component program end times that exceed the column oven end time will be truncated.

If a valve oven is installed, click on it (Front, Middle or Rear) to display the corresponding window. The valve oven is an optional, isothermal heated zone.



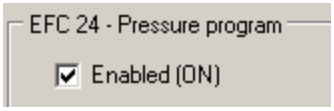
Heat-only zone parameter group

Check (or uncheck) the *Heater* option to indicate whether or not you will use the installed valve.

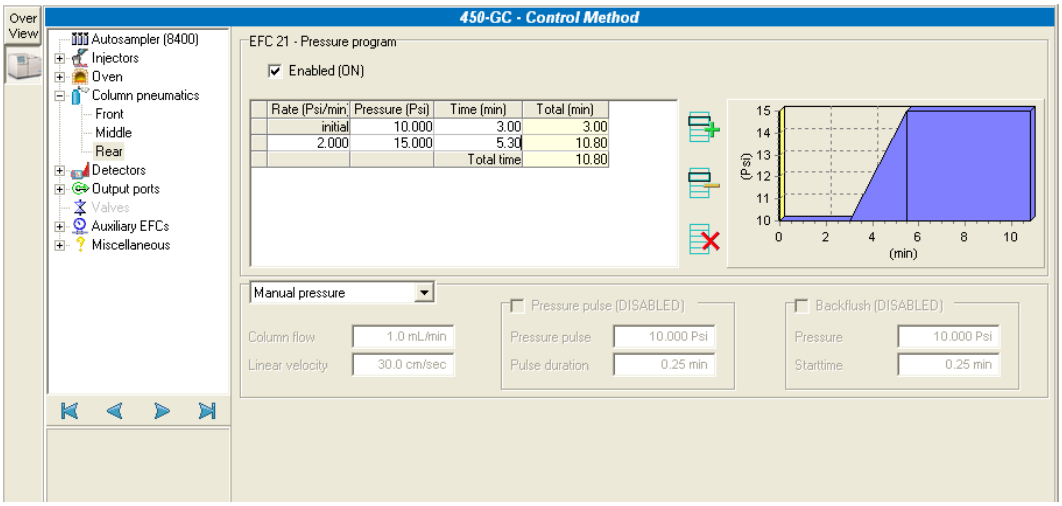
Enter the isothermal temperature of the valve oven in the *Setpoint* field.

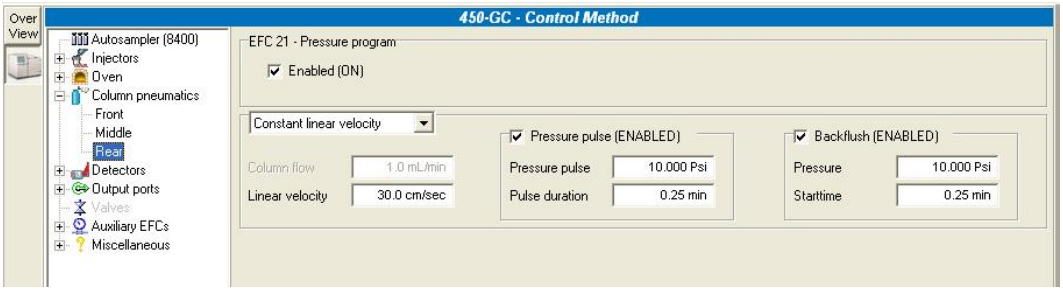
Column Pneumatics Control

The Column pneumatics window contains up to three Electronic Flow Control (EFC) Programs (Front, Middle, Rear). Use the EFC Programs to specify the pressure ramp of the Type 21, Type 22 and Type 25 EFC, the pressure ramp and total flow time program of the Type 24 EFC, and the flow ramp of the Type 23 EFC. All EFCs can be set on and off by clicking the Enabled checkbox.



Type 21 EFC (for PTV/S/SL split/splitless injectors)





NOTE: Type 21 and Type 25 EFCs are identical except with respect to the mechanical plumbing of the pressure sense line. Type 25 EFCs are identified as Type 21 EFCs in software.

Pressure program parameter group

Use the table to build a pressure ramp program.

The first row of the table contains the initial pressure and hold time for the Type 21 EFC. The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final pressure of each ramp segment in the *Pressure* column, the *Rate (Psi/min)* and the *Time* the EPC is held at this pressure in the corresponding columns.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

NOTE: The graph shows the pressure ramp program.

Pressure mode parameter group

Select *manual pressure* to fill in the pressure table, pressure pulse and backflush are disabled in this mode.

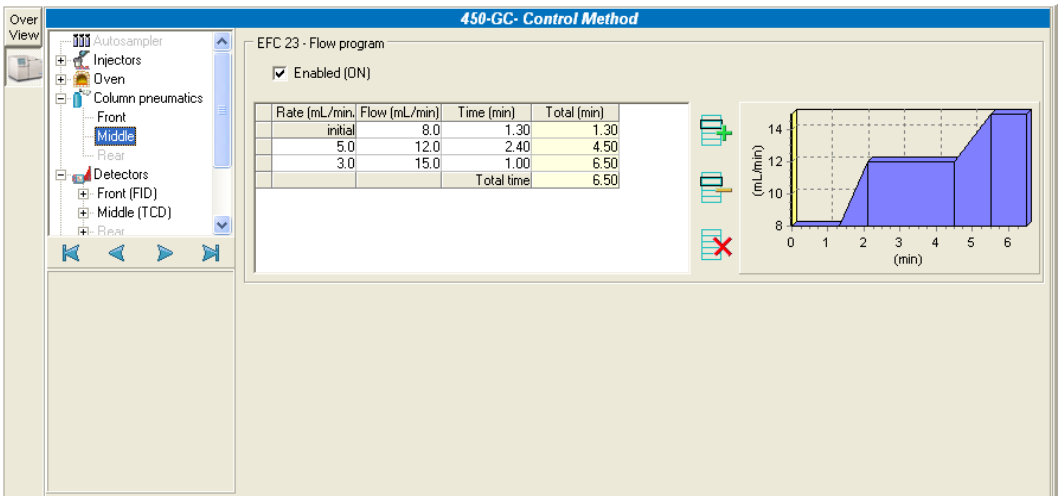
Select *Constant flow* option to disable the table and enter the desired constant *Column flow (mL/min)* in the corresponding field.

Select *Constant Linear velocity* to disable the table and enter the desired constant linear velocity (cm/sec) in the corresponding field.

Check the *Pressure pulse* option to perform a pressure pulse injection. Prior to injection, the pressure will change to the *Pressure pulse* pressure. After injection, the Pressure pulse pressure will be maintained for the *Pulse duration*.

Check the *Backflush* option to perform backflush, refer to the GC User Manual for more information.

Type 23 EFC (for packed columns)



Flow program parameter group

Use the table to build a flow ramp program.

The first row of the table contains the initial flow and hold time for the Type 23 EFC. The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final flow of each ramp segment in the *Flow* column, the *Rate* (*mL/min/min)* and the *Time* the segment is held at this flow in the corresponding columns.

Use the following buttons to edit the table:

to add a line to the table.

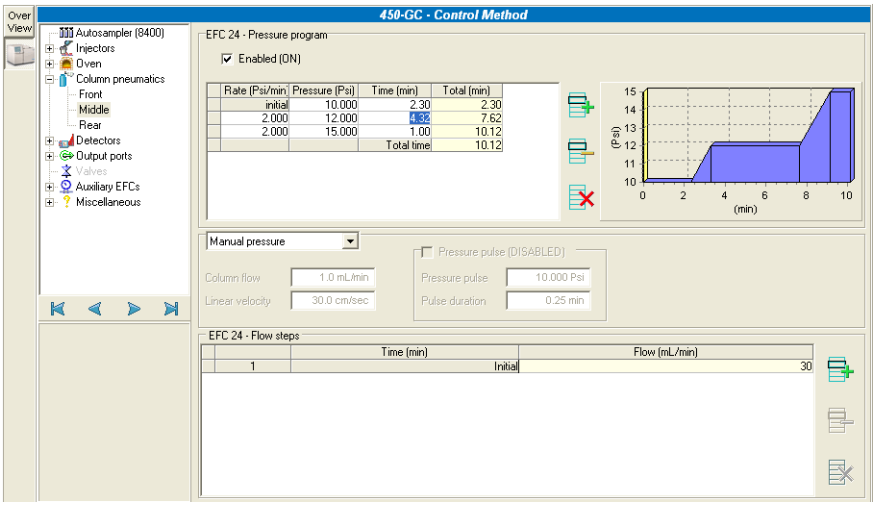
to delete a line in the table.

to clear the entire table.

NOTE: The graph shows the flow ramp program.

Type 24 EFC (for PWOC/FLASH and valved systems)

If a Type 24 EFC is installed, a pressure ramp table and a flow time program table will appear:



Pressure program parameter group

Use the first table to build a pressure ramp program.

The first row of the table contains the initial pressure and hold time for the Type 24 EFC. The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final pressure of each ramp segment in the *Pressure* column, the *Rate (Psi/min)* and the *Time* the EPC is held at this pressure in the corresponding columns.

NOTE: The graph shows the pressure ramp program.

Pressure mode parameter group

Select *manual pressure* to fill in the pressure table, pressure pulse and backflush are disabled in this mode.

Select *Constant flow* option to disable the table and enter the desired constant *Column flow (mL/min)* in the corresponding field.

Select *Constant Linear velocity* to disable the table and enter the desired constant linear velocity (cm/sec) in the corresponding field.

Check the *Pressure pulse* option to perform a pressure pulse injection. Prior to injection, the pressure will change to the *Pressure pulse* pressure. After injection, the Pressure pulse pressure will be maintained for the *Pulse duration*.

Check the *Backflush* option to perform backflush, refer to the GC User Manual for more information.

Flow steps parameter group

Use the second table to build a flow time program to control the Type 24 EFC total flow.

The first row of the flow table contains the initial total flow for the Type 24 EFC.

The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the time-programmed settings for the total flow. The total *Flow* will be switched to the value in each row at the indicated *Time*.

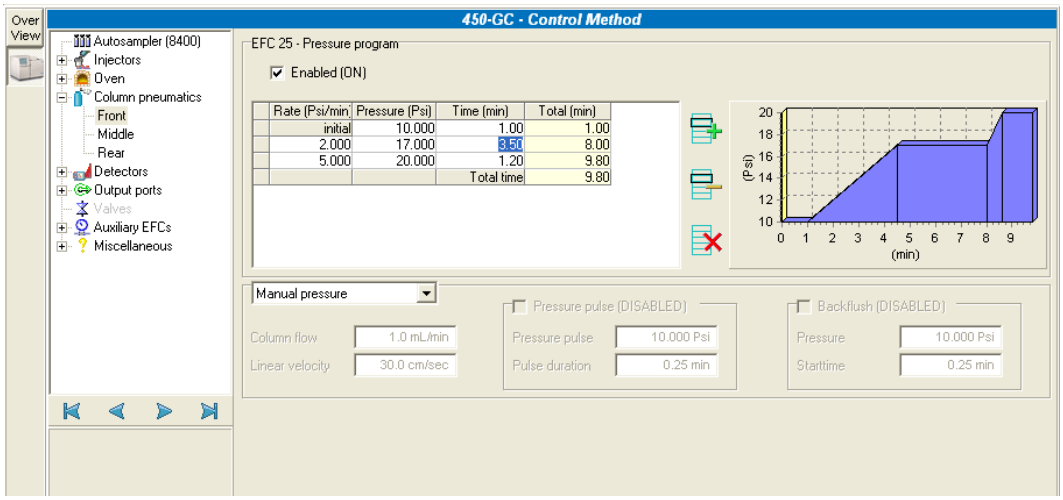
Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

Type 25 EFC (for PTV and S/SL injectors)



Pressure program parameter group

Use the table to build a pressure ramp program. The first row of the table contains the initial pressure and hold time for the Type 25 EFC. The EFC will equilibrate to this setting when the method is activated, and will be restored to this setting when each chromatographic run is completed. The rest of the table contains the programmed settings for each of the ramp segments. Enter the final pressure of each ramp segment in the *Pressure* column, the *Rate (Psi/min)* and the *Time* the EPC is held at this pressure in the corresponding columns.

Use the following buttons to edit the table:

to add a line to the table.

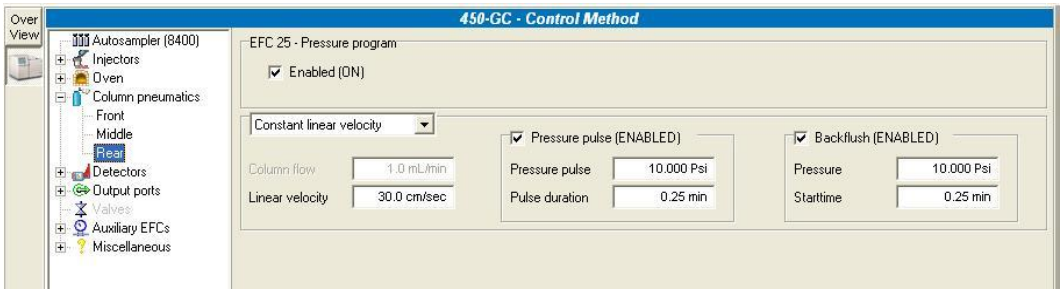
to delete a line in the table.

to clear the entire table.

NOTE: The graph shows the pressure ramp program.

Pressure mode parameter group

Select *manual pressure* to fill in the pressure table, pressure pulse and backflush are disabled in this mode.



Select *Constant flow* option to disable the table and enter the desired constant *Column flow (mL/min)* in the corresponding field.

Select *Constant Linear velocity* to disable the table and enter the desired constant linear velocity (cm/sec) in the corresponding field.

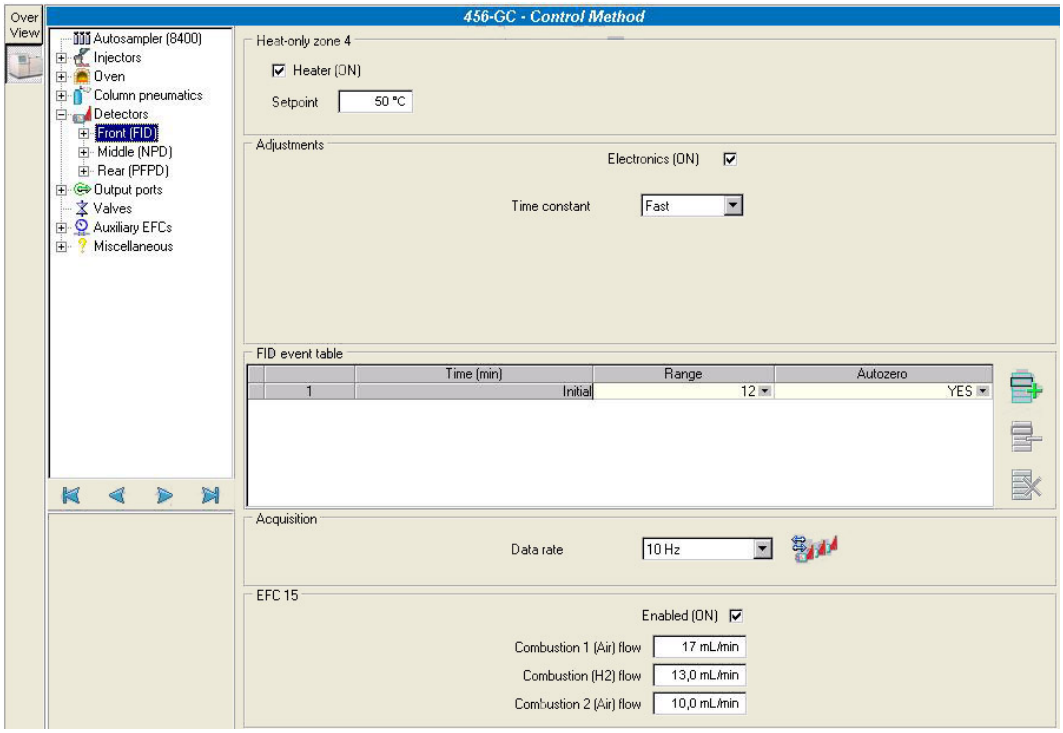
Check the *Pressure pulse* option to perform a pressure pulse injection. Prior to injection, the pressure will change to the *Pressure pulse* pressure. After injection, the Pressure pulse pressure will be maintained for the *Pulse duration*.

Check the *Backflush* option to perform backflush, refer to the GC User Manual for more information.

Detectors Control

The Detectors sub-section contains up to three detectors: Front, Middle, and Rear. Click on the detector you want to edit and specify the operating temperatures, gas flow rates, and specific parameters.

FID Detector (Flame Ionization Detector)



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the detector oven ON or OFF and enter the detector oven temperature in the *Setpoint* field.

Adjustments parameter group

Check (or uncheck) the *Electronics* option to indicate whether the installed FID will be used or not. Select the required *Time constant* from the list.

FID event table parameter group

Use the table to change detector settings during the analysis.

The first row of the table contains the initial *Range* and *Autozero* for the FID detector. When the initial autozero is set to yes, it means the detector autozero is on continuously before the run starts.

The rest of the table contains the time-programmed settings: the *Range* and *Autozero* will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

Acquisition

Set the detector frequency (Data rate). With the feature Multi Data Frequency Stream it is possible, in combination with a data handling package, to receive data from each detector in a specific frequency.

To use the Multi Data Frequency Stream feature, the AnalogOutput option enable must be unchecked (GC setup; detector tab) only if an option board is installed (GC). If AnalogOutput is used, the detector frequency between all detectors will be synchronized. A synchronization icon will be visible.

NOTE: In combination with an MIB 8x0 box, Multi Data Frequency Stream is not possible.

NOTE: AnalogOutput is disabled by default after installation of the option board. To make use of the Multi Data Frequency Stream feature, the AnalogOutput must remain disabled.

Multi Data Frequency Stream requirements:

- Only available in 436 and 456-GC.
- GC firmware must be version 5.06 or higher.
- Option board installed? Switch off AnalogOutput.
- CompassCDS “400 Series GC” driver must be version 2.0.3.17. or higher.

Type 11 EFC parameter group

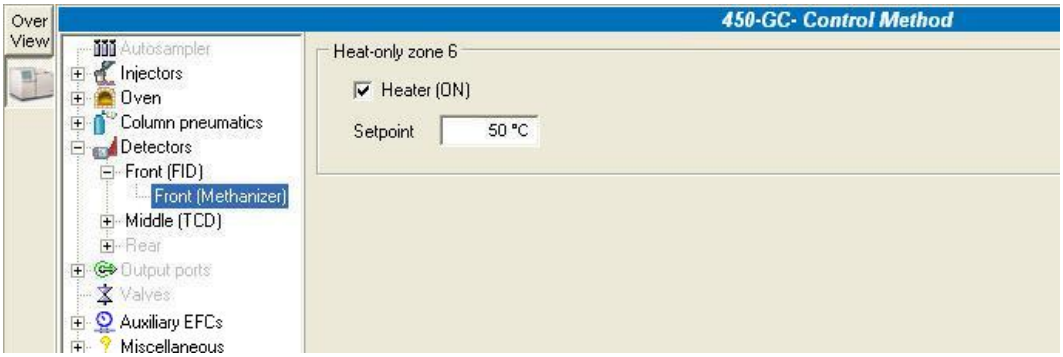
If the detector Electronic Flow Control module is installed, the Type 11 EFC section will appear and allow you to define the desired gas flow rates I**t is possible to turn the EFC on and off by clicking the Enabled checkbox:**

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For FID detectors, the EFC Type 11 is required.

Methanizer

A methanizer is an option that converts carbon monoxide and carbon dioxide to methane.

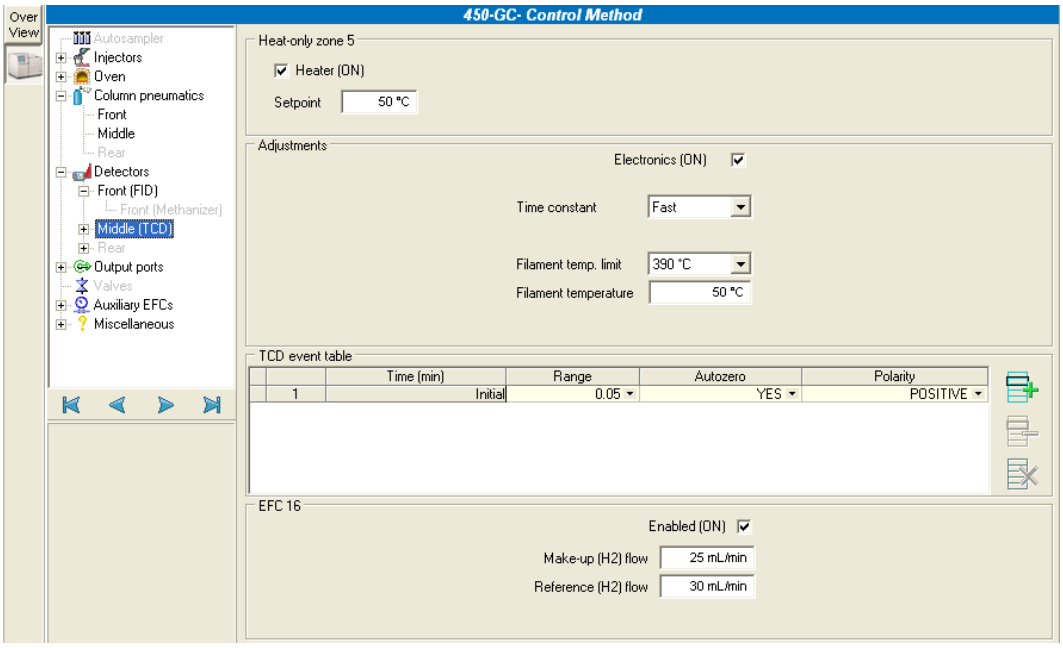
It is associated with a specific FID detector; consequently, it is accessed in the *Detector* section:



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the methanizer oven ON or OFF and enter the methanizer oven temperature in the *Setpoint* field.

TCD Detector (Thermal Conductivity Detector)



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the detector oven ON or OFF and enter the detector oven temperature in the *Setpoint* field.

Adjustments parameter group

Check (or uncheck) the *Electronics* option to indicate whether the installed TCD will be used or not. Select the required *Time constant* from the list.

Specify the *Filament temperature* in the corresponding field and select the *Filament temperature limit* from the list. To protect the filament, always operate the detector with the 390 °C limit selected unless you require the maximum dynamic range available to the TCD. With the limit set to 390 °C, the peak sample filament temperature is limited to approximately 450 °C. The temperature limit is approximately 550 °C at the 490 °C setting. The 450 °C limit protects filaments from oxidation when exposed to air over an extended period of time. However, at the 550 °C temperature limit the filament can degrade after only a few minutes.

TCD event table parameter group

Use the table to change detector settings during the analysis.

The first row of the table contains the initial *Range*, *Autozero* and *Polarity* for the TCD detector. When the initial autozero is set to yes, it means the detector autozero is on continuously before the run starts. The polarity is used to reverse the peaks that appear in the negative direction (for example, if you inject a standard or sample into the reference side of the TCD).

The rest of the table contains the time-programmed settings: the *Range*, *Autozero* and *Polarity* will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

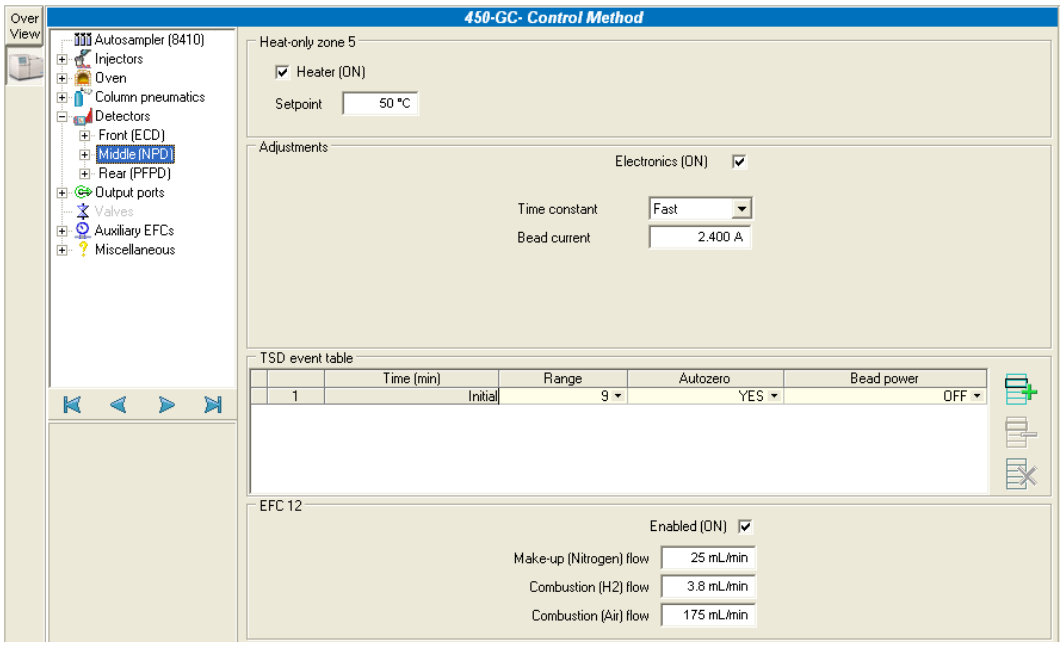
NOTE: In dual TCD detector the heater zone is common for both TCD detectors.

Type XY EFC parameter group for each type of EFC it is possible to turn the EFC on and off by clicking the Enabled checkbox:

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For TCD detectors, three EFC types are available: Type 13, Type 14 and Type 16.

If the detector Electronic Flow Control module is installed, the Type XY EFC section will appear and allows you to define the desired gas make up flow rate.

NPD Detector (Thermionic Specific Detector)



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the detector oven ON or OFF and enter the detector oven temperature in the *Setpoint* field.

Adjustments parameter group

Select the required *Time constant* from the list.

Specify the *Bead current* (i.e., bead surface temperature) in the corresponding field; it corresponds to the current at which the gas phase chemistry will initiate.

NPD event table parameter group

Use the table to change detector settings during the analysis.

The first row of the table contains the initial *Range*, *Autozero* and *Bead power* state for the NPD detector. When the initial autozero is set to yes, it means the detector autozero is on continuously before the run starts.

The rest of the table contains the time-programmed settings: the *Range*, *Autozero* and *Bead power* will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

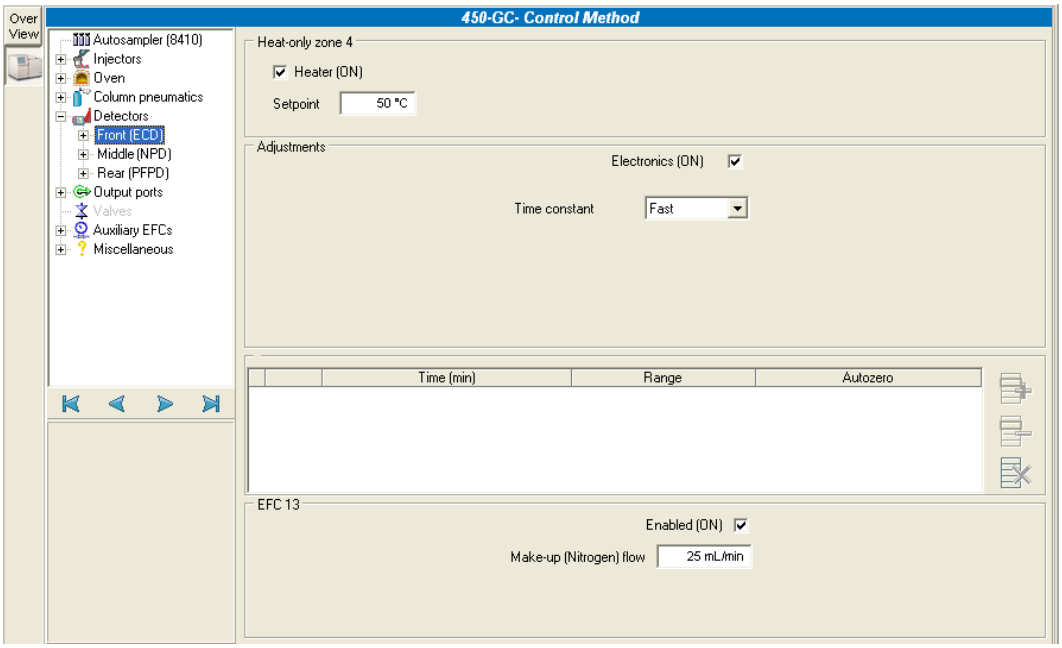
to clear the entire table.

Type 12 EFC parameter group

If the detector Electronic Flow Control module is installed, the Type 12 EFC section will appear and allows you to define the desired gas flow rates. I**t is possible to turn the EFC on and off by clicking the Enabled checkbox:**

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For NPD detectors, the EFC Type 12 is required.

ECD Detector (Electron Capture Detector)



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the detector oven ON or OFF and enter the detector oven temperature in the *Setpoint* field.

Adjustments parameter group

Check (or uncheck) the *Electronics* option to indicate whether the installed ECD will be used or not.

Select the required *Time constant* from the list. For most applications, select the SLOW setting. For capillary applications with peak widths at half height of less than 2 seconds, select the FAST setting.

Specify the *Cell current* and *Cell contact potential* in the corresponding fields.

The choice of cell current depends on the specific carrier gas that is used and the baseline signal with only carrier gas present. For normal operation with nitrogen carrier gas, use the N2STD or CAP setting. When a greater linear range is desired, select the Ar/CH4 setting and use 90%Argon / 10% Methane as the carrier gas.

ECD event table parameter group

Use the table to change detector settings during the analysis.

The first row of the table contains the initial *Range* and *Autozero* for the ECD detector. When the initial autozero is set to yes, it means the detector autozero is on continuously before the run starts.

The rest of the table contains the time-programmed settings: the *Range* and *Autozero* will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

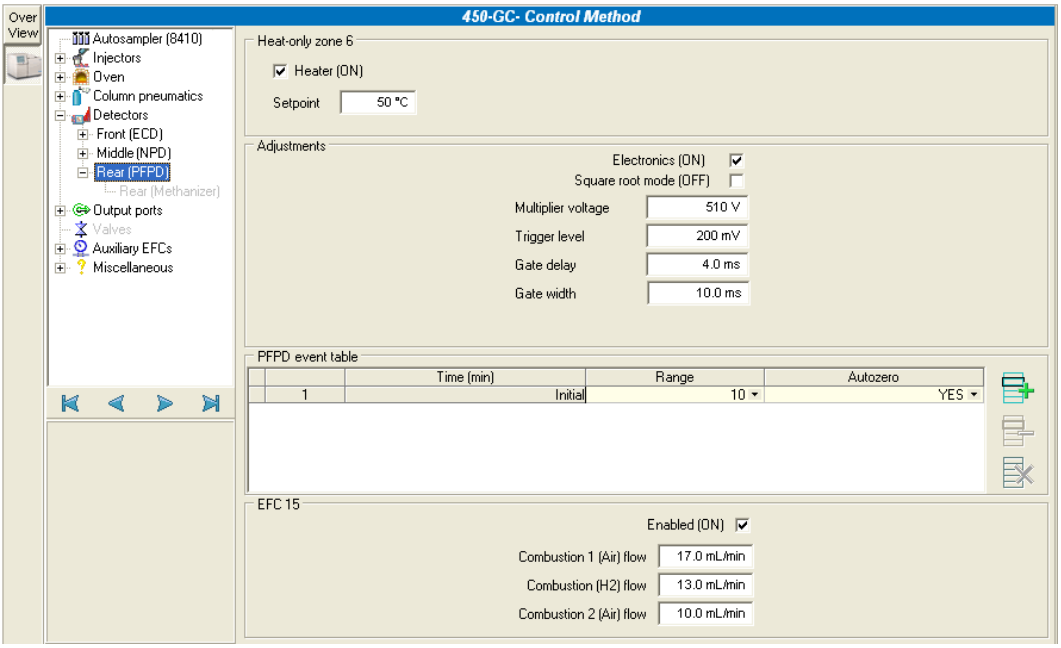
to clear the entire table.

Type 13 EFC parameter group

If the detector Electronic Flow Control module is installed, the Type 13 EFC section will appear and allows you to define the desired gas make-up flow rate. I**t is possible to turn the EFC on and off by clicking the Enabled checkbox:**

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For ECD detectors, the EFC Type 13 is required.

PFPD Detector (Pulsed Flame Photometric Detector)



Heat-only zone parameter group

Check (or uncheck) the *Heater* option to turn the detector oven ON or OFF and enter the detector oven temperature in the *Setpoint* field.

Adjustments parameter group

Check (or uncheck) the *Electronics* option to indicate whether the installed PFPD will be used or not.

Check (or uncheck) the *Square root mode* option to enable (or disable) this mode.

Enter the PFPD photomultiplier voltage in the *Tube voltage* field and select the desired *Trigger level*, *Gate delay* and *Gate width* in the corresponding fields.

PFPD event table parameter group

Use the table to change detector settings during the analysis.

The first row of the table contains the *initial Range* and *Autozero* for the PFPD detector. When the initial autozero is set to yes, it means the detector autozero is on continuously before the run starts.

The remainder of the table contains the time-programmed settings: the *Range* and *Autozero* will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

to delete a line in the table.

to clear the entire table.

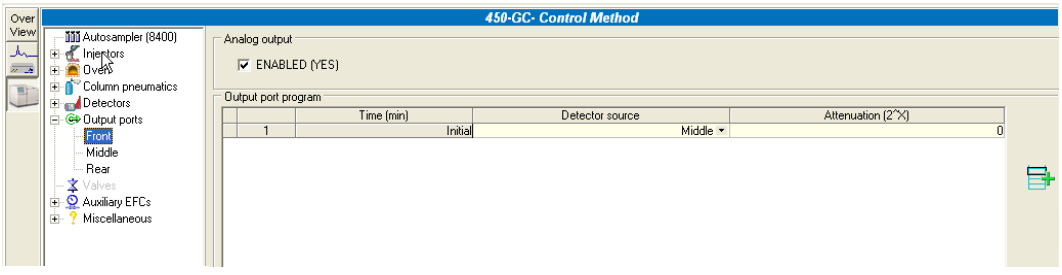
Type 15 EFC parameter group

If the detector Electronic Flow Control module is installed, the Type 15 EFC section will appear and allows you to define the desired gas flow rates. **It is possible to turn the EFC on and off by clicking the Enabled checkbox:**

NOTE: The Electronic Flow Control modules (EFC) are detector-specific and specified in the configuration manager. For PFPD detectors, the EFC Type 15 is required.

Output Ports Control

The 400 Series GC has three analog output ports, which allow analog data to be sent to external integrators or other analog data systems:



Analog output parameter group

Check (or uncheck) the Enabled option to turn the Analog output ON or OFF.

Output port program parameter group

Use the table to time program the *Detector* signal *source* and *Attenuation* at each port. The first row of the table contains the initial signal *source* and *Attenuation* for the port.

Use the following buttons to edit the table:

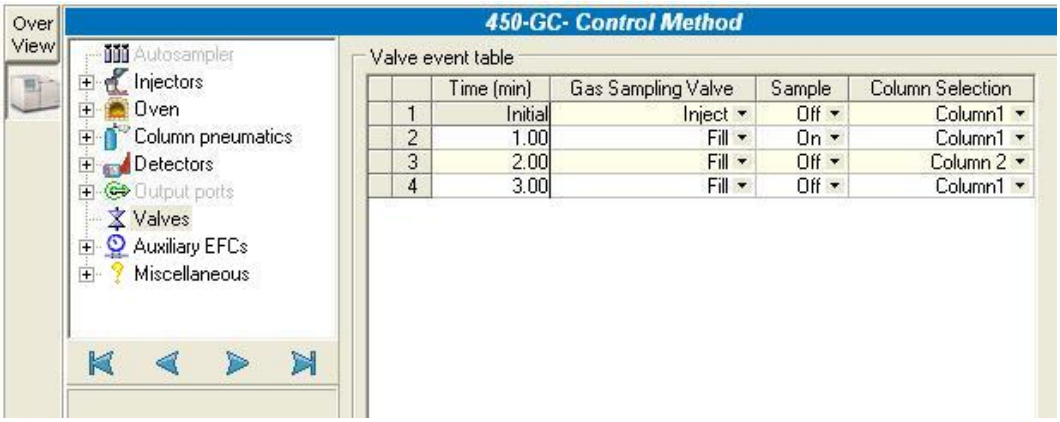
to add a line to the table.

to delete a line in the table.

to clear the entire table.

Valves Control

The 400 Series GC can be configured with a wide variety of valves. The Valves window contains the valves table program (for sample delivery) and up to fifteen valve oven programs:



Valve event table parameter group

Use the table to change valves settings during the analysis.

The first row of the table contains the initial setting for each valve. The rest of the table contains the time-programmed settings: each valve will be switched to the value in each row at the indicated *Time*.

Use the following buttons to edit the table:

to add a line to the table.

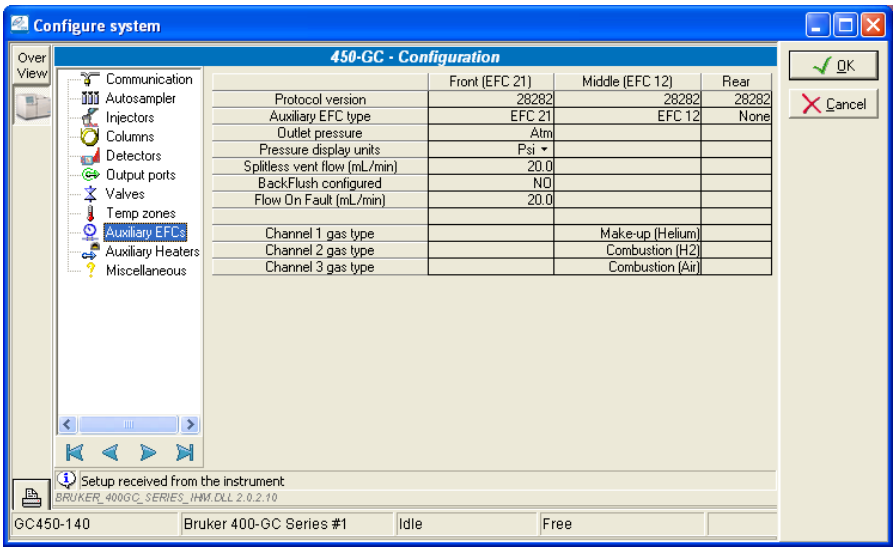
to delete a line in the table.

to clear the entire table.

Valve type	Description
Split valve	Splitless or split The 400 Series GC can have up to three split valves installed (Front, Middle, Rear)
Gas sampling valve	Fill or Inject
Liquid sampling valve	Fill or Inject
Sample	Off or On
Internal standard	Off or On
Surrogate standard	Off or On
Series bypass	Series or Bypass
Backflush to detector	Forward or Backflush
Backflush to vent	Forward or Backflush
Column selection	Column 1 or Column 2
Injection + Backflush to detector	Fill and Backflush or Inject
Injection + Backflush to vent	Fill and Backflush or Inject
Alternate injection	Column 1 or Column 2
Simultaneous injection	Fill or Inject
Methanizer bypass	Series or Bypass
Sample preconcentration trap	SPT desorb or SPT trap
Event A, B, C, D, E, F, G, H, I J	Off or On

Auxiliary EFCs

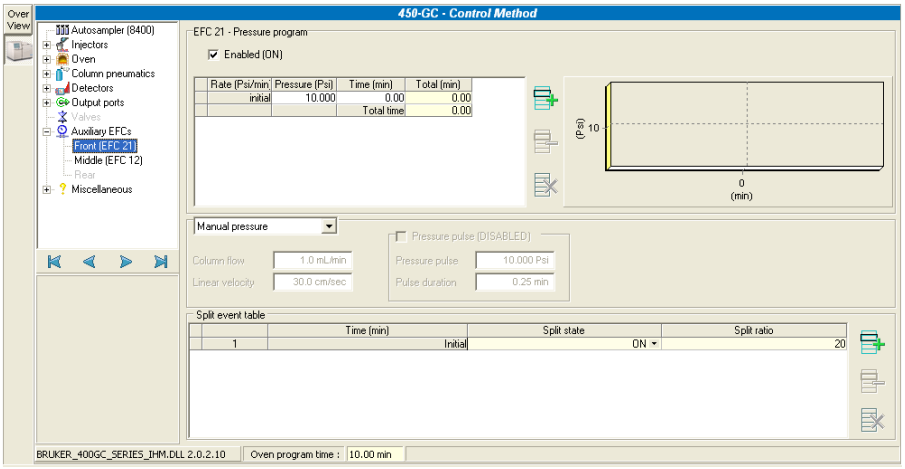
The Auxiliary EFCs window contains parameters for EFCs as a new device.



The EFCs represents al Injector and Detector EFCs and could be placed in front, middle and rear position.

If one or more auxiliary EFCs are configured a synopsis screen will be available for status indication.

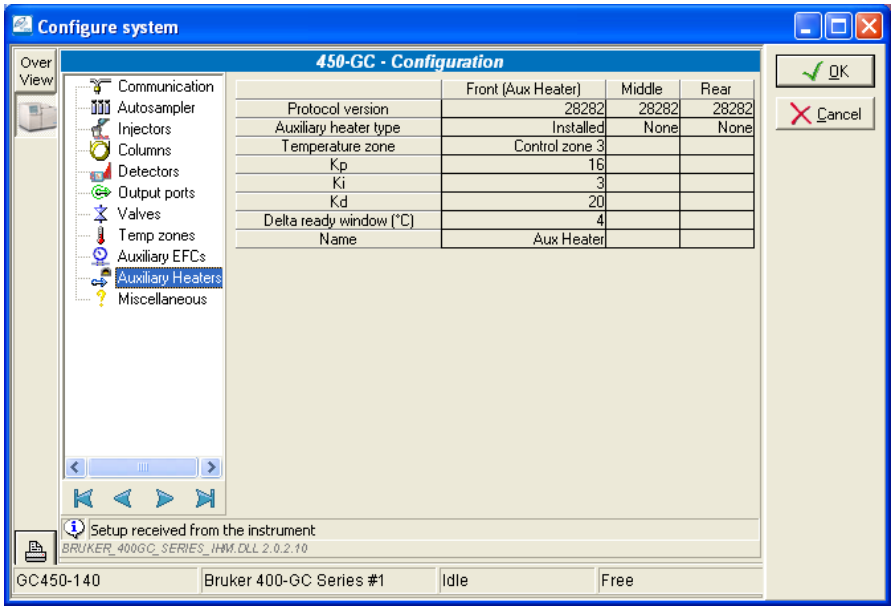
For details about the EFC see *Column Pneumatics Control* and Detectors Control.



Auxiliary Heaters

The Auxiliary Heaters window contains parameters for heated device as a new device.

If one or more auxiliary heater or valve oven is configured, a synopsis screen will be available for status information.



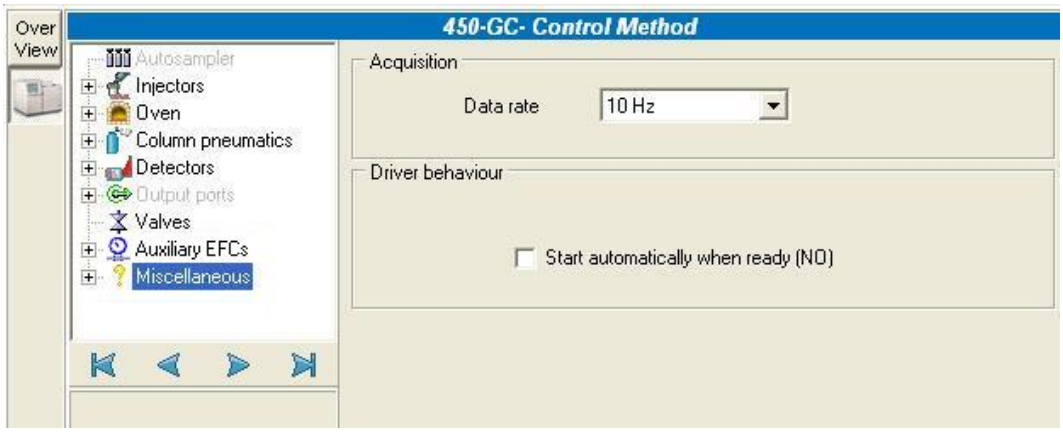
Heat-only zone parameter group

Check (or uncheck) the *Heater* option to indicate whether or not you will use the installed valve.

Enter the isothermal temperature of the Auxiliary Heater in the *Setpoint* field.

Miscellaneous

The Miscellaneous window contains parameters for data collection



Acquisition parameter group

Enter the detector data rate in the *Data rate* field. With decreased data rates, less disk space is required for storing the data. With increased rates, more data is collected, which may improve quantitation, particularly for narrow peaks.

Driver behavior parameter group

Check *Start automatically when ready* to start the GC without injecting. This could be useful in case of sampling valve use, for example.

Starting and Viewing an Acquisition

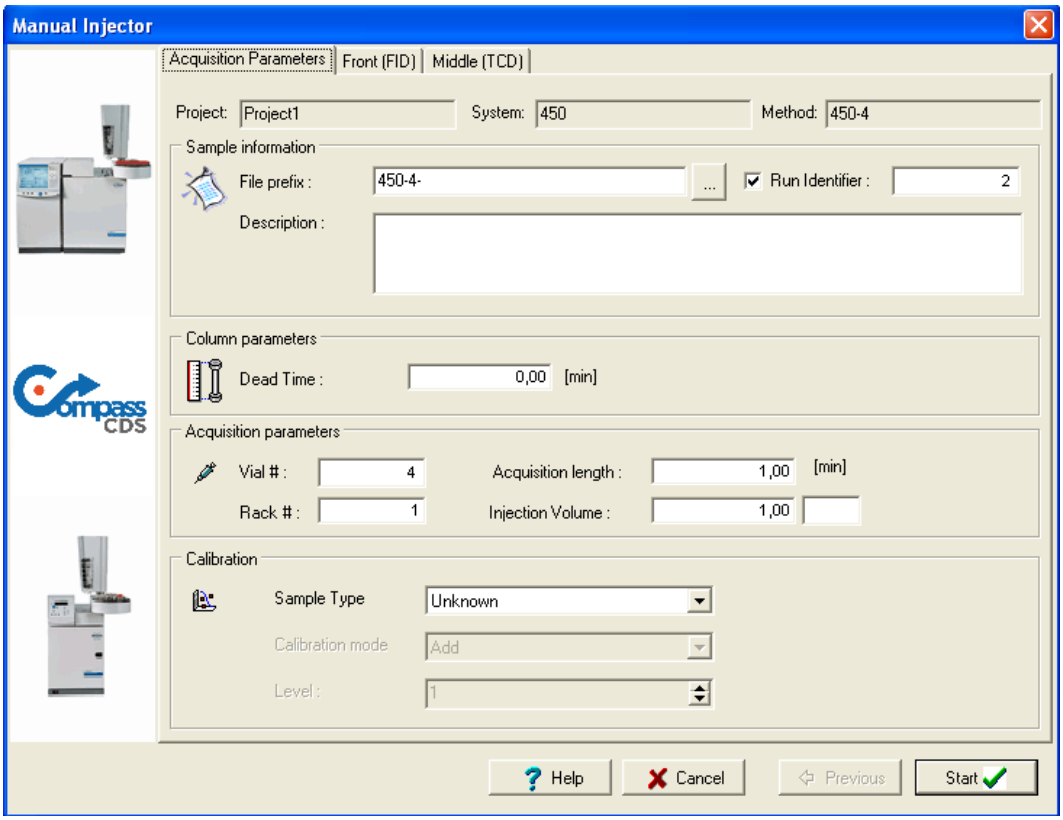
Quick Start and Sequence

Once the instrument control method has been correctly programmed, an analysis can be started. The next section briefly describes how to start an acquisition.

Quick Start (Single Acquisition)

1. Press the button.
2. In the ***Quick Start*** window, select the system, the method and optionally the project if connected in "All project" mode.
3. Press the *OK* button.

The following screen is displayed:



In the *Acquisition parameters* tab, required like the *Run Name*, the *Run ID* and the *Acquisition length* must be filled before starting an analysis. Furthermore, if the system is equipped with an autosampler controlled by CompassCDS, the *Injection Volume*, the *Vial* position and the *Rack* number (if required) must be entered.

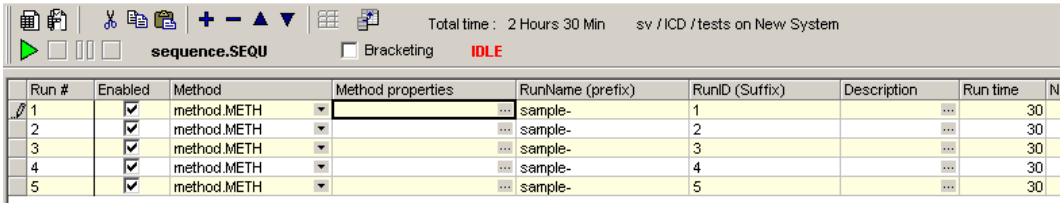
Other parameters associated with each acquisition channel can be entered in the *Channel X* tab.

4. Click on the *Start* button to start the acquisition if the system is a single-injector system or click on the *Next* button if the system is a multiple injector system. In a multiple injector system, the same parameters entered for the first injector must be entered for the other injectors before starting the acquisition.

Sequence

1. To create a sequence, select the ***FILE / NEW SEQUENCE*** *menu*, and complete the displayed creation wizard screen (refer to the CompassCDS User Guide), by entering the system name that will perform the analysis, the number of lines (corresponding to the number of samples), and the sequence name.

2. The sequence is displayed. Complete the sequence information columns (refer to the CompassCDS User Guide).



Run #	Enabled	Method	Method properties	RunName (prefix)	RunID (Suffix)	Description	Run time
1	☑	method.METH		sample-	1		30
2	☑	method.METH		sample-	2		30
3	☑	method.METH		sample-	3		30
4	☑	method.METH		sample-	4		30
5	☑	method.METH		sample-	5		30

The *Method Name*, the *Run Name*, the *Run ID,* and the *Acquisition length* must be filled before starting the analysis. All these parameters are automatically imported from the acquisition part if defined in the method.

3. Start the sequence by clicking on the button.

NOTE: For more details about how to start an acquisition, refer to the CompassCDS User Guide.

Running Acquisition Status

Viewing a Running Acquisition

To view a running acquisition, click on the *Systems* tab then select the running system. A window is activated which is composed of two parts: the running chromatogram and the status window where the driver modules are listed.

Status of the 400 Series GC

Click on the button corresponding to the 400 Series GC driver and the status screen will appear. It contains nine sub-sections: *Autosampler*, *Injectors*, *Column oven*, *Columns*, *Detectors*, *Output ports*, *Valves*, *Miscellaneous*, and *Overview*. Click on the required sub-section to display the corresponding parameters that will be used during the chromatographic run.

A toolbar allows you to easily scroll through the status windows:

to select the first status window.

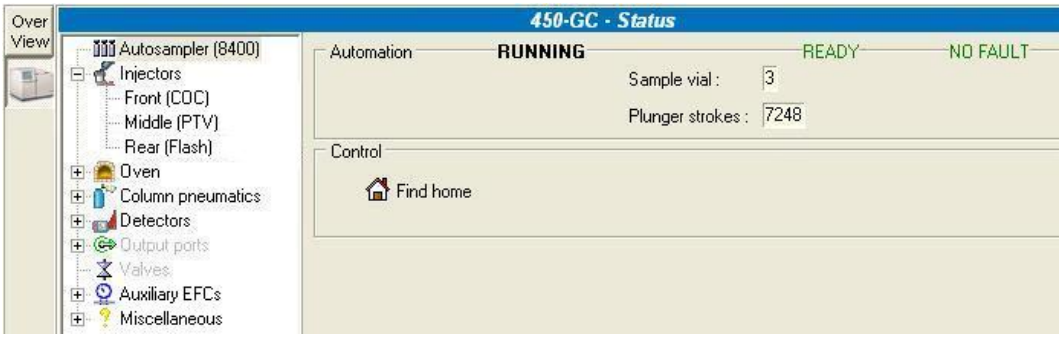
to move back to the previous status window.

to move forward to the next status window.

to select the final status window.

Autosampler Window

This option is only shown on 400 Series GC that have an 8400 AutoSampler or 8410 AutoInjector connected to them.



The Autosampler status screen indicates the autosampler state (Ready, Running, Suspended, Resetting or Running Priority Sample).

The display also includes the following parameters:

Sample vial: Corresponds to the current vial.

Plunger Strokes: Displays the number of times that the syringe plunger has been stroked up and down. This can be used to help monitor syringe wear and plan for syringe replacement.

Present: Indicates whether the tray is present or not.

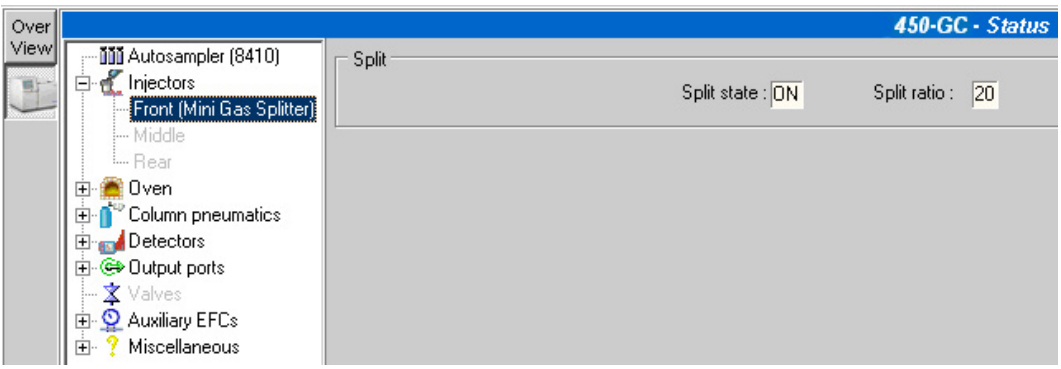
Orientation: Shows the range of vials accessible from the carrousel location (8410 AutoInjector Only)

Click on the

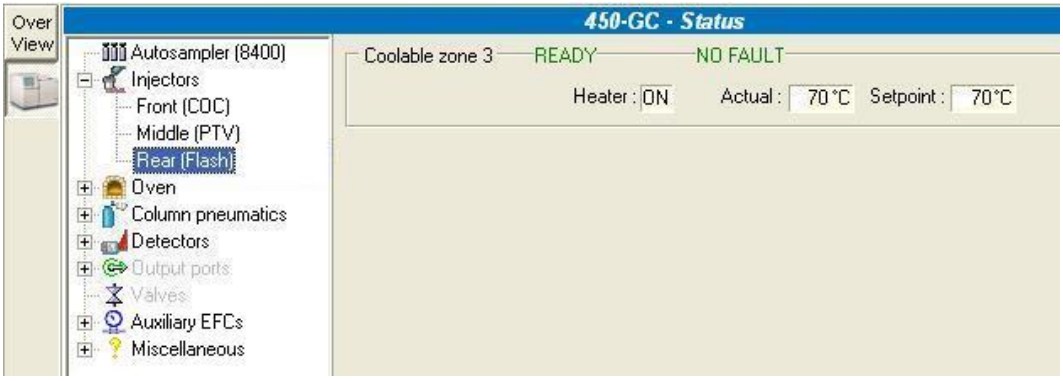
button to reinitialize the autosampler.

Mini Gas Splitter Window

This option is only shown on a 400 Series GC that have a Mini Gas Splitter.



Injectors Window



The following status parameters are available for any injector type:

Ready, *Not ready or OFF*: The injector oven is Ready if the setpoints have been achieved and stabilized. The injector oven is Not Ready if readiness to start a run has not been achieved or if, during a run, the oven becomes not ready or goes out of tolerance. The injector oven is OFF when the heater is OFF.

Fault or *No Fault*: Displays if a fault in the injector component has occurred.

Heater: Displays if the injector oven component is turned OFF or ON at the 400 Series GC.

Actual: Displays the actual temperature of the injector oven at the 400 Series GC.

Setpoint: Displays the injector oven programmed temperature setting in the active method.

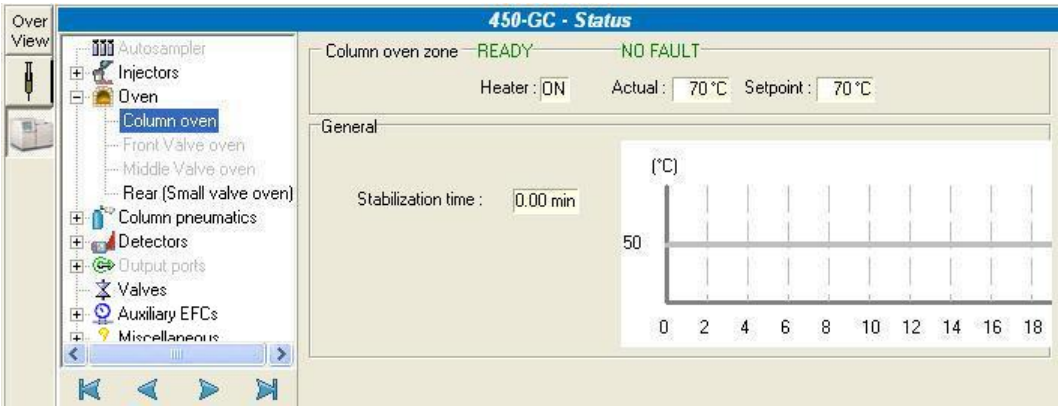
NOTE: The Mini Gas Sampler injector does not have the heating parameters.

Other parameters can be displayed according to the injector type:

Injector	Parameter	Description
PTV	Coolant enable	displays if the PTV injector oven coolant is enabled in the active method.
	Timeout period	displays the programmed coolant time-out value in the active method for the PTV injector oven. The countdown begin as soon the temperature is reached and injector turns to ready. GC is turned on standby as soon as the countdown is finished.
	Threshold	displays the programmed injector oven temperature at which the PTV injector oven coolant is enabled.
	Split state	displays the current split state of the PTV injector method.
	Split ratio	displays the current split ratio of the PTV injector method. The split ratio is defined as the (Column Flow + the Split Flow) / the Column Flow.
S/SL	Split state	displays the current split state of the S/SL injector method.
	Split ratio	displays the current split ratio of the S/SL injector method. The split ratio is defined as the (Column Flow + Split Flow) / the Column Flow.
SPT	Coolant enable	displays if the SPT injector oven coolant is enabled in the active method.

Injector	Parameter	Description
	Threshold	displays the programmed injector oven temperature at which the SPT injector oven coolant is enabled.
	Timeout period	displays the programmed coolant time-out value in the active method for the SPT injector oven.
MGS	Split state	displays the current split state of the MGS injector method.
	Split ratio	displays the current split ratio of the MGS injector method. The split ratio is defined as the (Column Flow + Split Flow) / the Column Flow.

Oven Window Column Oven



The status displays includes the following parameters:

Ready, *Not Ready or OFF:* The column oven is Ready if the setpoints have been achieved and stabilized. The column oven is Not Ready if readiness to start a run has not been achieved or if, during a run, the oven becomes not ready or goes out of tolerance. The column oven is OFF when the Heater is turned OFF.

NOTE: Some reasons the GC may go Not Ready during a run are: the temperature program is too aggressive, the oven door is opened, the coolant runs out, the power line voltage drops, etc.

Fault or No Fault: Displays if a fault in the column oven component has occurred.

Heater: Displays if the column oven component is turned OFF or ON at the 400 Series GC.

Actual: Displays the actual temperature of the column oven at the 400 Series GC.

Setpoint: Displays the column oven programmed temperature setting in the active method.

The graph of Column oven program is displayed.

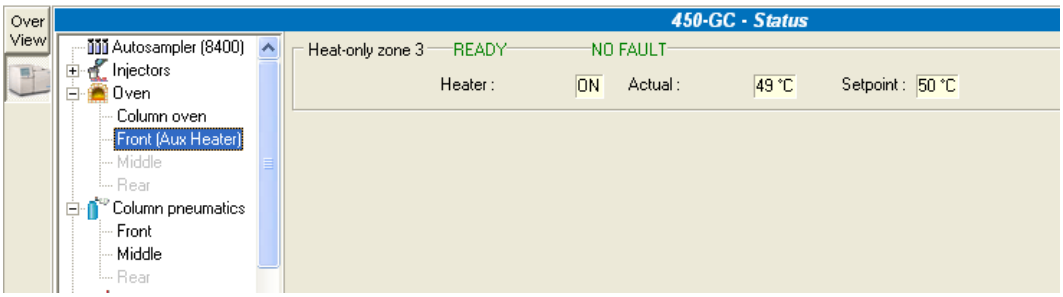
Coolant enable: Displays if the column oven coolant is enabled in the active method.

Threshold: Displays the programmed column oven temperature at which the column oven coolant is enabled.

Timeout period: Displays the programmed coolant time-out value in the active method for the column oven.

Stabilization time: Shows the 400 Series GC column oven stabilization time in minutes. The stabilization time counts down from the programmed method value and then displays 0.00 minutes when the stabilization period is over.

Oven Window Auxiliary Heater



The status display includes the following parameters:

Ready, *Not Ready or OFF:* The Aux. heater is Ready if the setpoint have been achieved and stabilized. The Aux. heater is Not Ready if readiness to start a run has not been achieved or if, during a run, the Aux. heater becomes not ready or goes out of tolerance. The Aux. heater is OFF when the heater is turned OFF.

Fault or No Fault: Displays if a fault in the Aux. heater component has occurred.

Heater: Displays if the Aux. heater component is turned OFF or ON at the 400 Series GC.

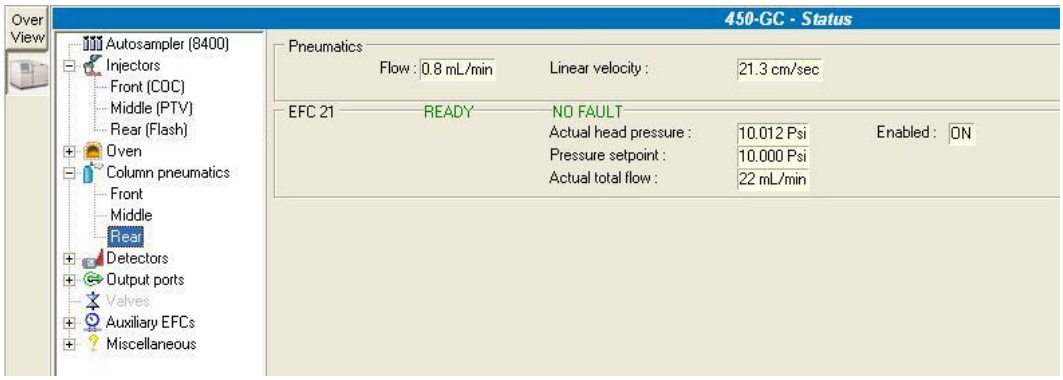
Actual: Displays the actual temperature of the Aux. heater at the 400 Series GC.

Setpoint: Displays the Aux. heater isotherm temperature setting in the active method.

Column Pneumatics window

The columns status screen depends on the installed EFC modules.

Type 21 EFC Status screen



The status display includes the following parameters:

Ready or *Not Ready*: The Type 21 Injector EFC component is Ready if the setpoints have been achieved and stabilized. The Type 1 Injector EFC component is Not Ready if readiness to start a run has not been achieved or if, during a run, the EFC becomes not ready or goes out of tolerance.

Fault or *No Fault*: Displays if a fault in the Type 21 EFC component has occurred.

Flow: Displays, in mL/min, the column flow rate calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

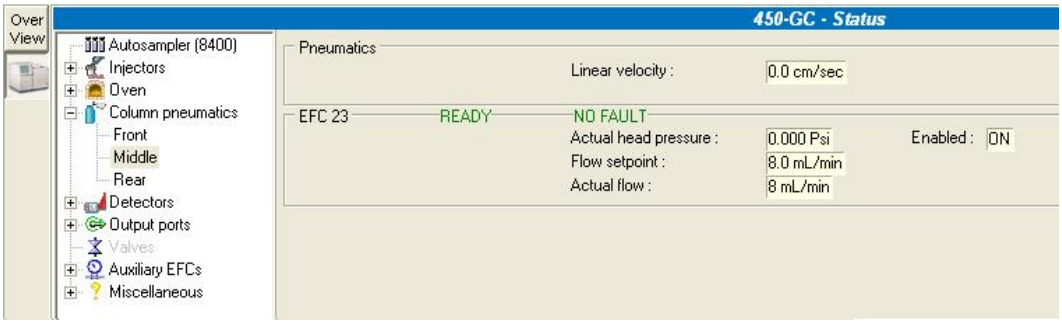
Linear velocity: Displays the column linear velocity calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Actual head pressure: Displays the actual column head pressure at the 400 Series GC.

Pressure setpoint: Displays the programmed column head pressure setting in the active method.

Actual total flow: Displays, in mL/min, the total flow rate through the system.

Type 23 EFC Status screen



The status display includes the following parameters:

Ready or *Not Ready*: The Type 23 Injector EFC component is Ready if the setpoints have been achieved and stabilized. The Type 23 Injector EFC component is Not Ready if readiness to start a run has not been achieved or if, during a run, the EFC becomes not ready or goes out of tolerance.

Fault or *No Fault*: Displays if a fault in the Type 23 EFC component has occurred.

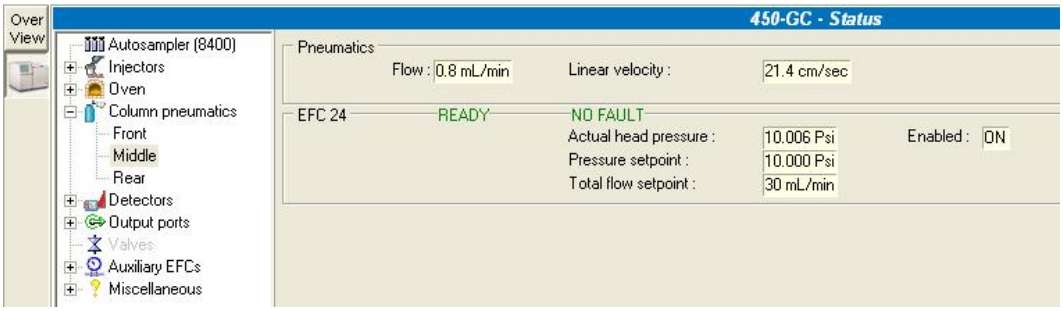
Linear velocity: Displays the column linear velocity calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Actual head pressure: Displays the measured column head pressure at the 400 Series GC.

Total flow setpoint: Displays the programmed total flow rate setting in the active method.

Actual flow: Displays, in mL/min, the actual total flow rate.

Type 24 EFC Status screen



The status display includes the following parameters:

Ready or *Not Ready*: The Type 24 Injector EFC component is Ready if the setpoints have been achieved and stabilized. The Type 24 Injector EFC component is Not Ready if readiness to start a run has not been achieved or if, during a run, the EFC becomes not ready or goes out of tolerance.

Fault or *No Fault*: Displays if a fault in the Type 24 EFC component has occurred.

Flow: Displays, in mL/min, the column flow rate calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

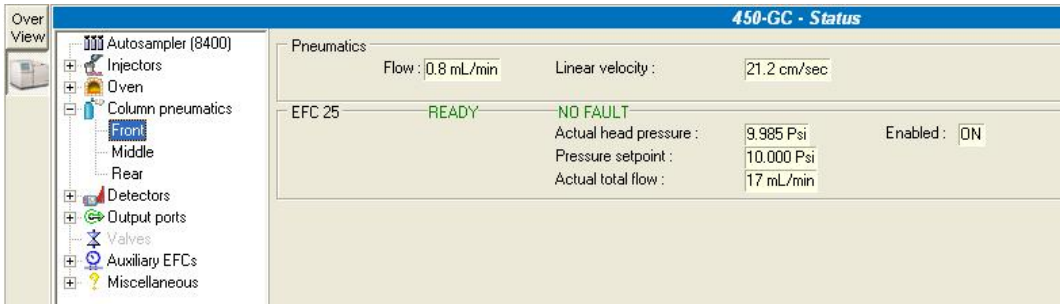
Linear velocity: Displays the column linear velocity calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Actual head pressure: Displays the actual column head pressure at the 400 Series GC.

Pressure setpoint: Displays the programmed column head pressure setting in the active method.

Total flow setpoint: Displays, in mL/min, the programmed total flow rate in the active method.

Type 25 EFC Status screen



The status display includes the following parameters:

Ready or *Not Ready*: The Type 25 Injector EFC component is Ready if the setpoints have been achieved and stabilized. The Type 25 Injector EFC component is Not Ready if readiness to start a run has not been achieved or if, during a run, the EFC becomes not ready or goes out of tolerance.

Fault or *No Fault*: Displays if a fault in the Type 25 EFC component has occurred.

Flow: Displays, in mL/min, the column flow rate calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Linear velocity: Displays the column linear velocity calculated from the column head pressure, column temperature, and column parameters (carrier gas, column length, and internal diameter).

Actual head pressure: Displays the actual column head pressure at the 400 Series GC.

Pressure setpoint: Displays the programmed column head pressure setting in the active method.

Actual total flow: Displays, in mL/min, the total flow rate through the system.

Detectors Window

The detector status screen depends on the installed detector.

The following parameters are available for all the detectors:

The status display includes the following parameters:
-*Ready*, *Not Ready or OFF:* The detector is Ready if the setpoints have been achieved and stabilized. The detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the detector becomes not ready or goes out of tolerance. The detector is OFF if electronics and Heater are turned OFF.

-No fault or Fault to indicate if an error occurs on the GC.

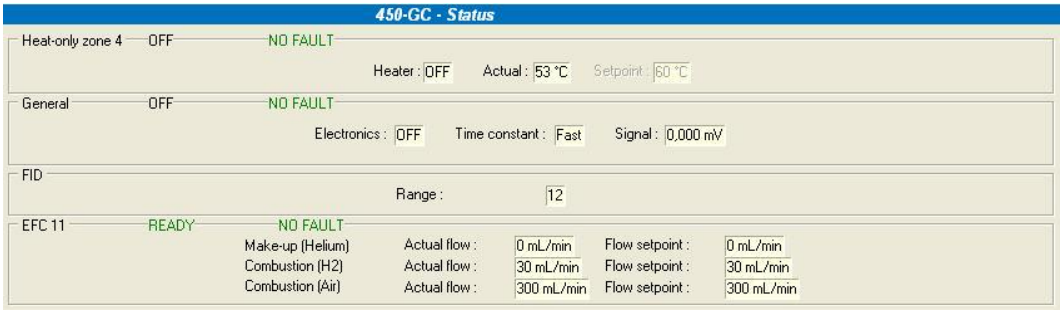
Heater: Displays if the injector oven component is turned OFF or ON at the 400 Series GC.

Actual: Displays the actual temperature of the injector oven at the 400 Series GC.

Setpoint: Displays the injector oven programmed temperature setting in the active method.

Some other parameters are dependent of the type of detector:

FID Status screen



The status display includes the following parameters:
Ready, *Not Ready or OFF* The FID detector is Ready if the setpoints have been achieved and stabilized. The FID detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the FID detector becomes not ready or goes out of tolerance. The FID detector is OFF if electronics and heater are turned OFF.

Fault or *No Fault:* Displays if a fault in the FID detector component has occurred.

Electronics: Displays the FID Electronics setting in the active method.

Time constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

Signal: Displays, in mV, the actual FID detector signal at the 400 Series GC.

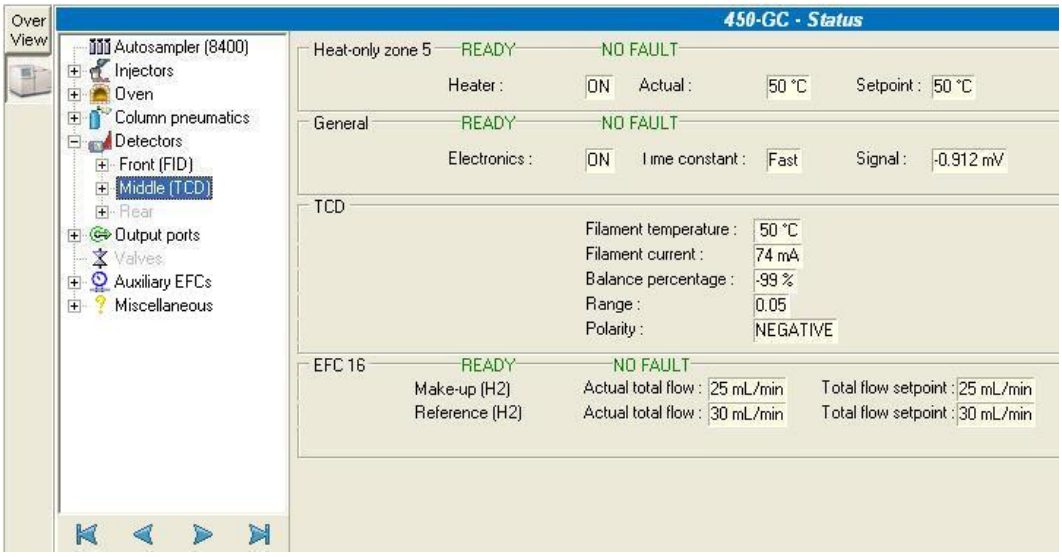
Flame: On or Off.

Range: 9, 10, 11, or 12. Displays the FID Range initial condition setting or the time-programmed setting in the active method.

If the detector Electronic Flow Control module is installed, the Type 11 EFC section will appear and displays the following parameters:

EFC Type	Parameter	Description
Type 11 EFC	Ready	or Not Ready.
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 1 flow rate
	H_2	Displays in mL/min, the setpoint and actual channel 2 flow rate
	Air	Displays, in mL/min, the setpoint and actual channel 3 flow rate.

TCD Status screen


Over View
450-GC - Status
Autosampler (8400)
Injectors
Oven
Column pneumatics
Detectors
Front (FID)
Middle (TCD)
Rear
Output ports
Valves
Auxiliary EFCs
Miscellaneous
Heat-only zone 5 READY NO FAULT
Heater : ON Actual : 50 °C Setpoint : 50 °C
General READY NO FAULT
Electronics : ON Time constant : Fast Signal : -0.912 mV
TCD
Filament temperature : 50 °C
Filament current : 74 mA
Balance percentage : -99 %
Range : 0.05
Polarity : NEGATIVE
EFC 16 READY NO FAULT
Make-up (H2) Actual total flow : 25 mL/min Total flow setpoint : 25 mL/min
Reference (H2) Actual total flow : 30 mL/min Total flow setpoint : 30 mL/min

The status display includes the following parameters:

Ready, Not Ready or OFF: The TCD detector is Ready if the setpoints have been achieved and stabilized. The TCD detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the TCD detector becomes not ready or goes out of tolerance. The TCD detector is OFF if electronics and heater are turned OFF.

Fault or No Fault: Displays if a fault in the TCD detector component has occurred.

Electronics: Displays the TCD Electronics setting in the active method.

Time constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

Signal: Displays, in mV, the actual TCD detector signal at the 400 Series GC.

Filament temperature: Displays the TCD Filament Temperature setting in the active method.

Filament current: Displays, in mA, the actual TCD current.

Balance percentage: Displays, in %, the TCD bridge balance.

Range: 0.05, 0.5, or 5.0. Displays the current TCD Range.

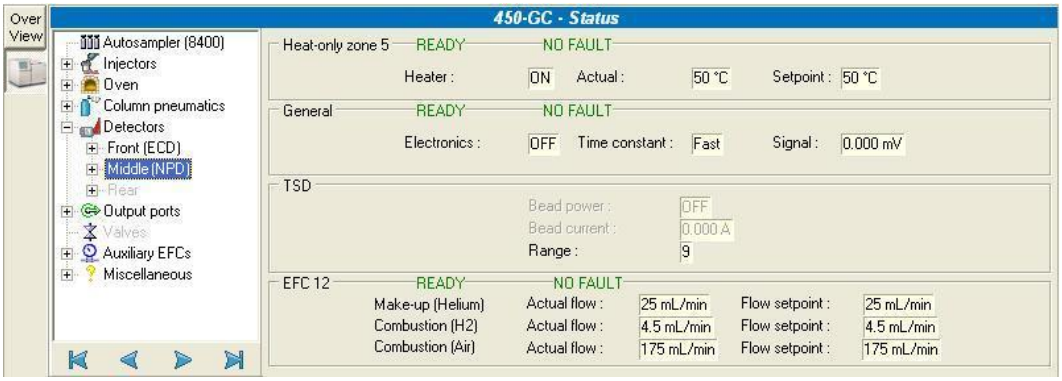
Polarity: Displays the current TCD Polarity.

If the detector Electronic Flow Control module is installed, the Type XY EFC section will appear. Three EFC modules can be used with the TCD detector.

The table below shows the corresponding EFC status items:

EFC Type	Parameter	Description
Type 13 EFC	Ready	or Not Ready.
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 1 flow rate
Type 14 EFC	Ready	or Not Ready.
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 2 flow rate if channel 2 is configured as Helium, Nitrogen, or Argon make up.
	Reference	Displays, in mL/min, the setpoint and actual channel 2 flow rate if channel 2 is configured as Helium, Nitrogen, or Argon reference.
Type 16 EFC	Ready	or Not Ready.
	Fault	or No Fault. Displays if a fault in the EFC module has occurred.
	Makeup	Displays, in mL/min, the setpoint and actual channel 2 flow rate if channel 2 is configured as Hydrogen make up.
	Reference	Displays, in mL/min, the setpoint and actual channel 2 flow rate if channel 2 is configured as Hydrogen reference.

NPD Status screen



The status display includes the following parameters:

Ready, *Not Ready or OFF*: The NPD detector is Ready if the setpoints have been achieved and stabilized. The NPD detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the NPD detector becomes not ready or goes out of tolerance. The NPD detector is OFF if electronics and heater are turned OFF.

Fault or *No Fault*: Displays if a fault in the NPD detector component has occurred.

Electronics: Displays NPD Electronics setting in the active method.

Time constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

Signal: Displays, in mV, the actual NPD detector signal at the 400 Series GC.

Bead power: Displays the current NPD Bead Power.

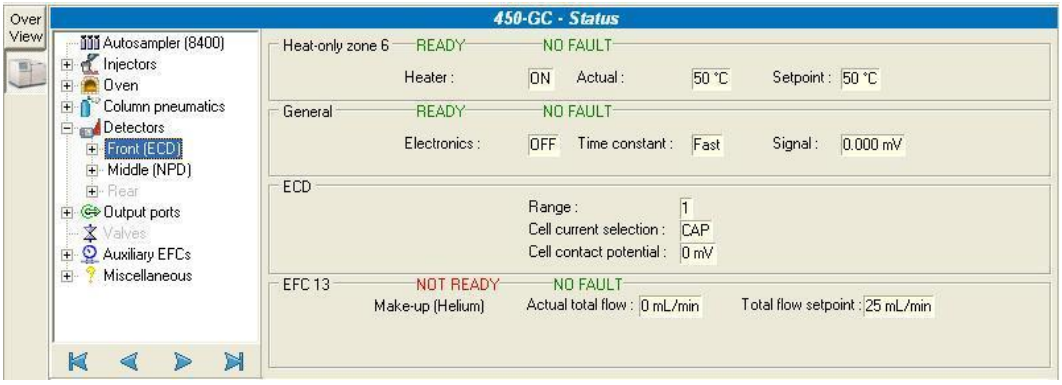
Bead current: Displays the NPD Bead Current setting in the active method.

Range: 9, 10, 11, or 12. Displays the current NPD Range.

If the detector Electronic Flow Control module is installed, the Type 12 EFC section will appear and displays the following parameters:

EFC Type	Parameter	Description
Type 12 EFC	Ready	or Not Ready
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 1 flow rate
	H_2	Displays in mL/min, the setpoint and actual channel 2 flow rate
	Air	Displays, in mL/min, the setpoint and actual channel 3 flow rate.

ECD Status screen



The status display includes the following parameters:
Ready, *Not Ready or OFF*: The ECD detector is Ready if the setpoints have been achieved and stabilized. The ECD detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the ECD detector becomes not ready or goes out of tolerance. The ECD detector is OFF if electronics and heater are turned OFF.

Fault or *No Fault*: Displays if a fault in the ECD detector component has occurred.

Electronics: Displays the ECD Electronics setting in the active method.

Time constant: Fast (50 msec) or Slow (200 msec). Displays the electrometer time constant setting in the active method.

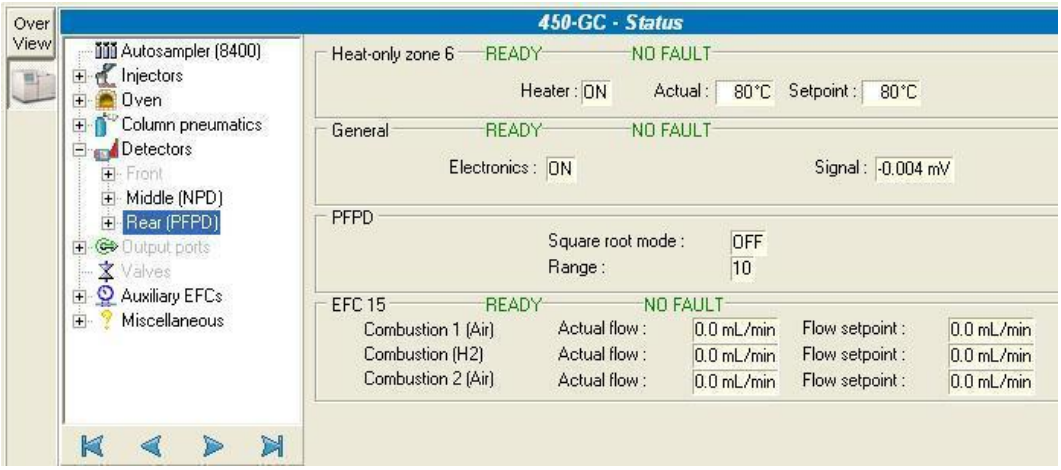
Signal: Displays, in mV, the actual ECD detector signal at the 400 Series GC.

Range: 1 or 10. Displays the current ECD Range.

If the detector Electronic Flow Control module is installed, the Type 13 EFC section will appear and displays the following parameters:

EFC Type	Parameter	Description
Type 13 EFC	Ready	or Not Ready
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 1 flow rate

PFPD Status screen


Over View
450-GC - Status
Autosampler (8400)
Injectors
Oven
Column pneumatics
Detectors
Front
Middle (NPD)
Rear (PFPD)
Output ports
Valves
Auxiliary EFCs
Miscellaneous
Heat-only zone 6 READY NO FAULT
Heater : ON Actual : 80°C Setpoint : 80°C
General READY NO FAULT
Electronics : ON Signal : -0.004 mV
PFPD
Square root mode : OFF
Range : 10
EFC 15 READY NO FAULT
Combustion 1 (Air) Actual flow : 0.0 mL/min Flow setpoint : 0.0 mL/min
Combustion (H2) Actual flow : 0.0 mL/min Flow setpoint : 0.0 mL/min
Combustion 2 (Air) Actual flow : 0.0 mL/min Flow setpoint : 0.0 mL/min

The status display includes the following parameters:
Ready, *Not Ready or OFF*: The PFPD detector is Ready if the setpoints have been achieved and stabilized. The PFPD detector is Not Ready if readiness to start a run has not been achieved or if, during a run, the PFPD detector becomes not ready or goes out of tolerance. The PFPD detector is OFF if electronics and heater are turned OFF.

Fault or *No Fault:* Displays if a fault in the PFPD detector component has occurred.

Electronics: Displays the PFPD Electronics setting in the active method.

Signal: Displays, in mV, the actual PFPD detector signal at the 400 Series GC.

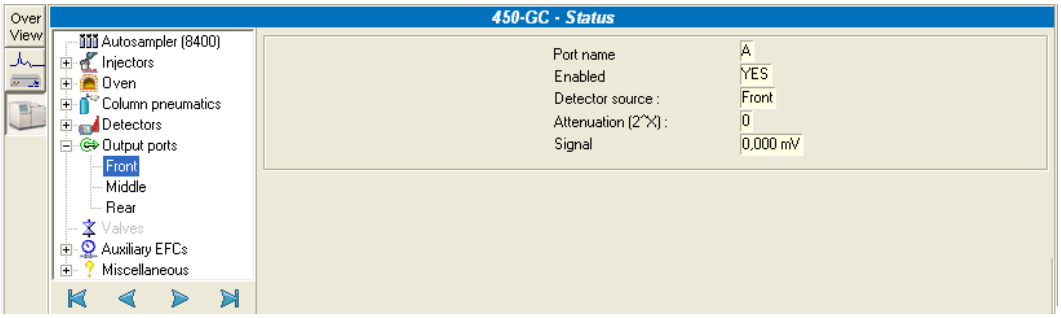
Square root mode: Displays the PFPD Square Root Mode setting in the active method.

Range: 8, 9 or 10. Displays the current PFPD Range.

If the detector Electronic Flow Control module is installed, the Type 15 EFC section will appear and displays the following parameters:

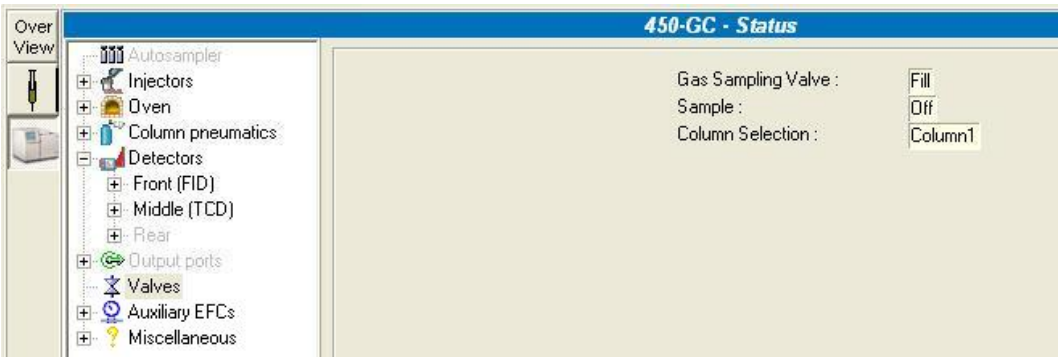
EFC Type	Parameter	Description
Type 15 EFC	Ready	or Not Ready.
	Fault	or No Fault. Displays if a fault in the EFC module has occurred
	Makeup	Displays, in mL/min, the setpoint and actual channel 1 flow rate
	H_2	Displays in mL/min, the setpoint and actual channel 2 flow rate
	Air	Displays, in mL/min, the setpoint and actual channel 3 flow rate.

Output Ports Window



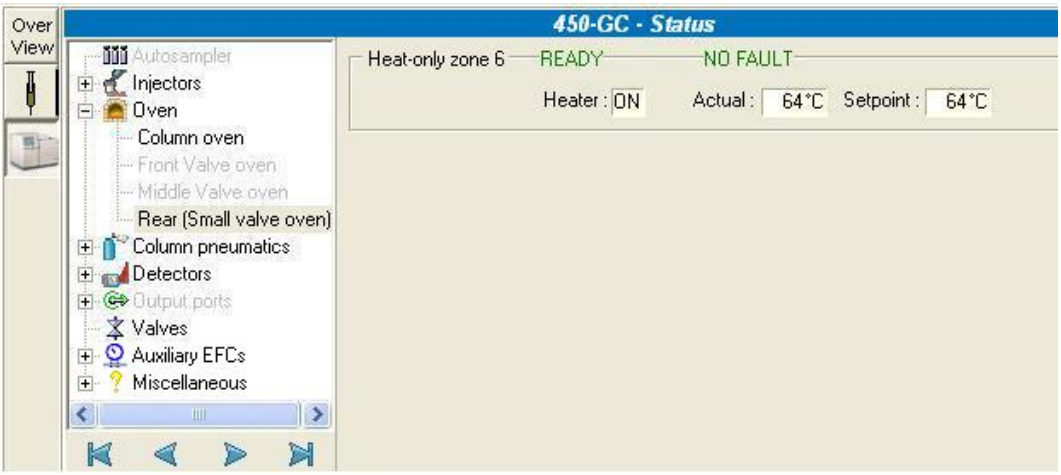
The status screen displays the actual *Detector source*, *Attenuation* and *Signal* for the corresponding port.

Valves Window



If the valves are configured, the status displays the assigned valve name and current state at the 400 Series GC.

If a valve oven is installed, the status displays the following parameters:

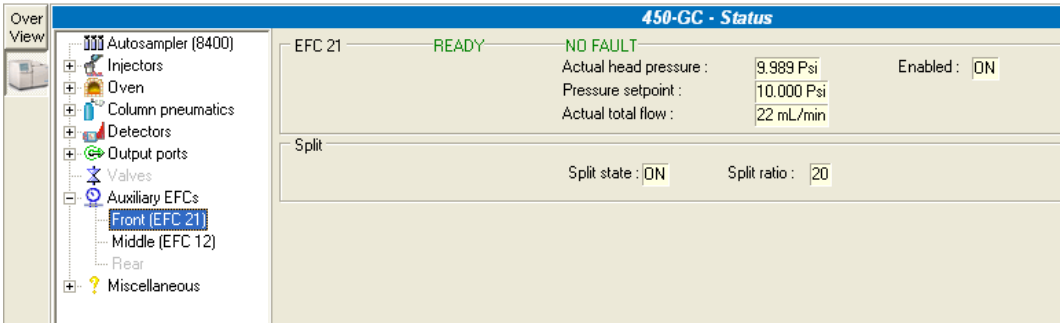


Heater: Displays if the valve oven is turned OFF or ON at the 400 Series GC.

Actual: Displays the actual temperature of the valve oven at the 400 Series GC.

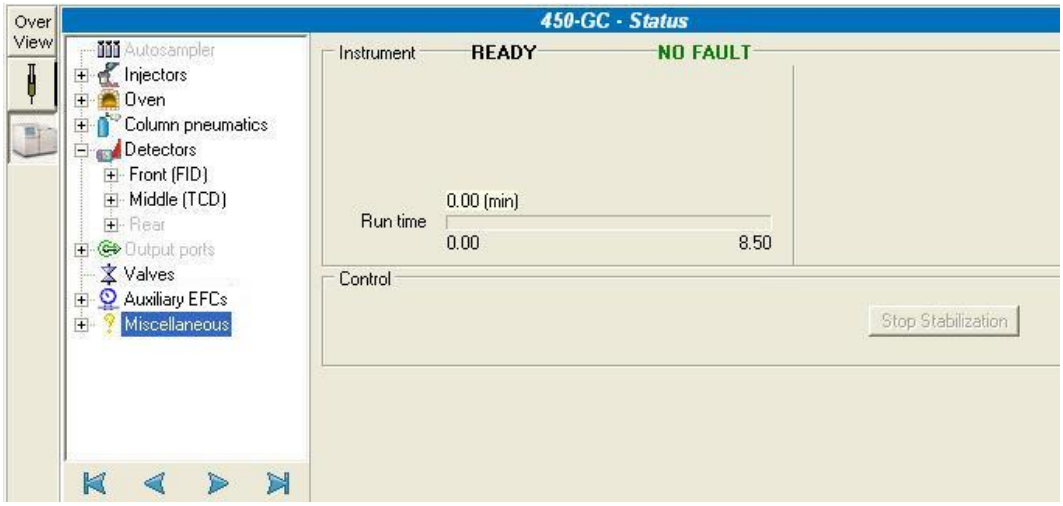
Setpoint: Displays the valve oven temperature setting in the active method.

Auxiliary EFCs Window



For details about the EFC see Column Pneumatics Status and Detectors Status.

Miscellaneous Window



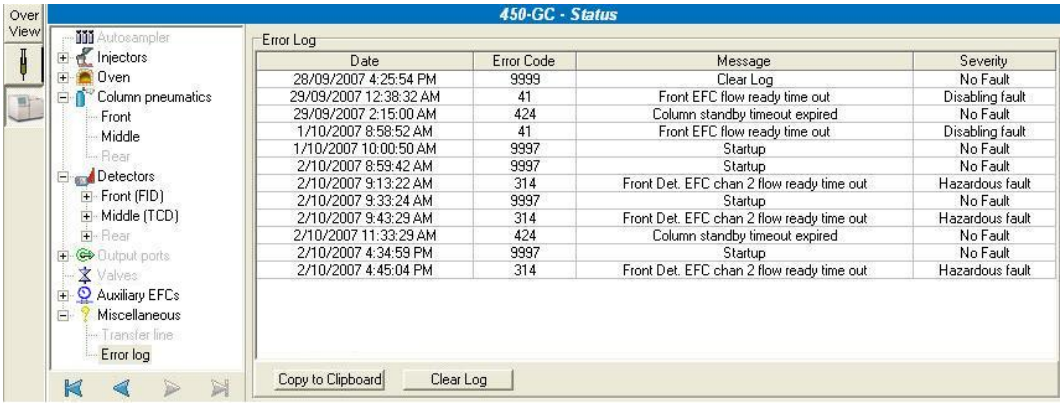
The miscellaneous screen contains general information about the current run and the overall state of the instrument.

The state of the instrument (Ready, Running, Stabilizing, Equilibrating, Computing, Needs Monitor, Monitoring, Sampling, Connecting, or Not Ready) is displayed.

A Fault / No Fault indicator is also shown. When a hazardous or disabling fault occurs, any run in progress will halt and the affected component will shut down. If the fault is recoverable, then the run is not terminated.

The run time bar displays the elapsed time in minutes since the beginning of the run and the end time.

Error log Window


450-GC - Status
Over View
Autosampler
Injectors
Oven
Column pneumatics
Front
Middle
Rear
Detectors
Front (FID)
Middle (TCD)
Rear
Output ports
Valves
Auxiliary EFCs
Miscellaneous
Transfer line
Error log
Error Log
Date | Error Code | Message | Severity
28/09/2007 4:25:54 PM | 9999 | Clear Log | No Fault
29/09/2007 12:38:32 AM | 41 | Front EFC flow ready time out | Disabling fault
29/09/2007 2:15:00 AM | 424 | Column standby timeout expired | No Fault
1/10/2007 8:58:52 AM | 41 | Front EFC flow ready time out | Disabling fault
1/10/2007 10:00:50 AM | 9997 | Startup | No Fault
2/10/2007 8:59:42 AM | 9997 | Startup | No Fault
2/10/2007 9:13:22 AM | 314 | Front Det. EFC chan 2 flow ready time out | Hazardous fault
2/10/2007 9:33:24 AM | 9997 | Startup | No Fault
2/10/2007 9:43:29 AM | 314 | Front Det. EFC chan 2 flow ready time out | Hazardous fault
2/10/2007 11:33:29 AM | 424 | Column standby timeout expired | No Fault
2/10/2007 4:34:59 PM | 9997 | Startup | No Fault
2/10/2007 4:45:04 PM | 314 | Front Det. EFC chan 2 flow ready time out | Hazardous fault
Copy to Clipboard
Clear Log

The Error log screen contains error logs from the instrument.

Press the Clear Log button to reset the GC error logs

Press the Copy to Clipboard button to copy all error logs and have the possibility to paste it in a text editor file.

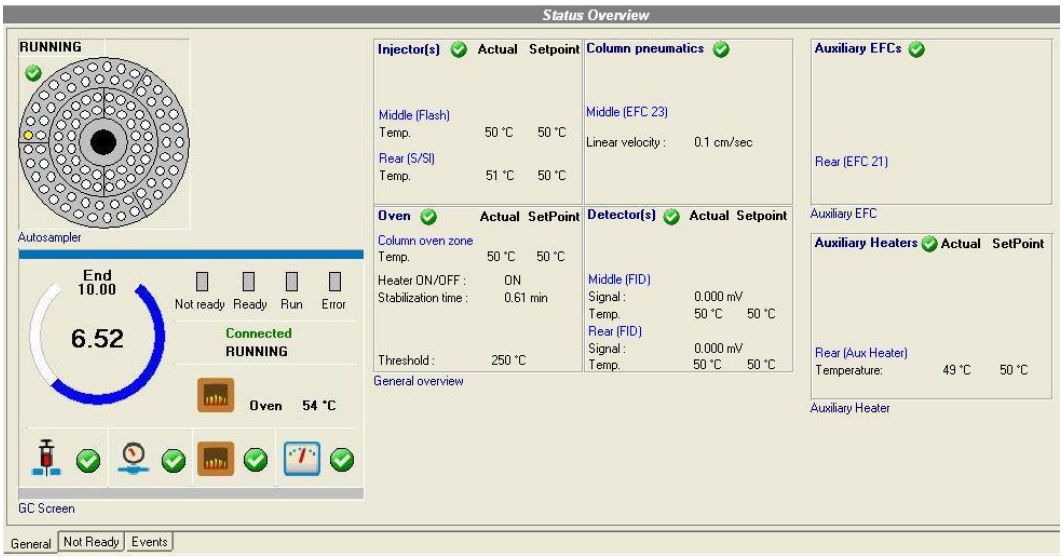
NOTE: When an error occurs on the GC a pop-up window warns you of the instrument error, stop the acquisition and the sequence and add a line in this error logs screen.

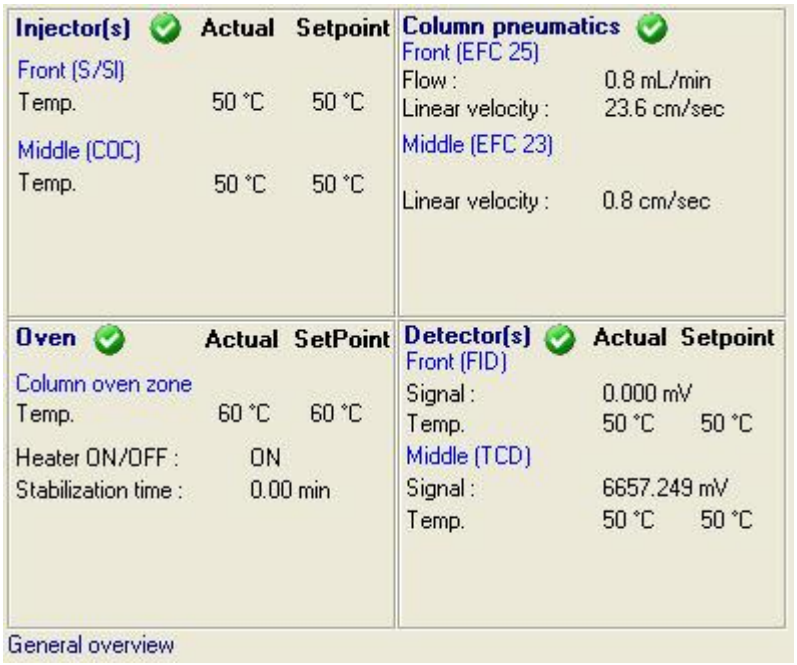
Overview Window

Click on the Over View button: the ***Status Overview*** window is displayed and contains three tabs (to configure this screen see the chapter "*Configuring the synopsis*"):

General Tab*:* displays the synopsis of the GC, where some current values can be read (temperatures, pressures, signal, etc.), for all GC modules.

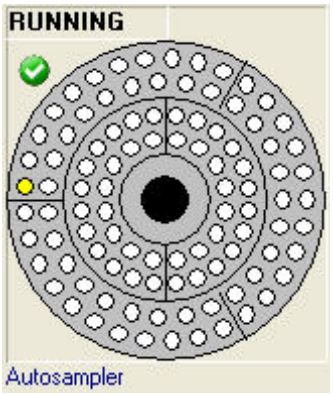
The general overview





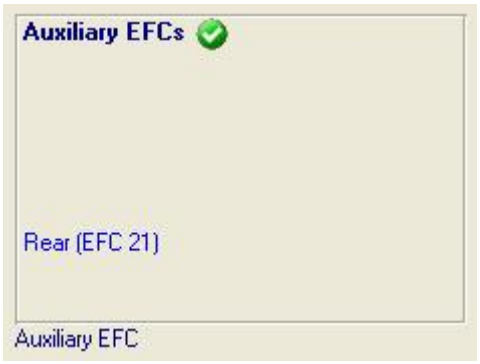
The general overview displays the state of the modules (Injectors, Column pneumatics, Oven, Detectors), the flow and temperature (current and setpoint) and the signal value.

The Autosampler



In the Autosampler module, when the mouse points to a colored vial (yellow for current vial, green for already used vial, and red for missing vial), the current vial number and the number of injections are displayed.

The Aux EFCs screen:



This screen is only visible if Aux EFCs are available in the configuration of the Instrument.

The Aux Heaters screen:

This screen is only visible if Aux heaters and/or small/Large valve ovens are available in the configuration of the Instrument.

The GC screen:

The GC screen overview displays the sate the modules, without temperature, pressure, etc. values.

The colored circles indicate the state of the GC.

: The Green circle means READY

: The Yellow circle means NOT READY

: The Grey circle means OFF

: The Red circle means ERROR

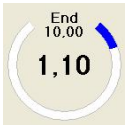
The general GC state (Not ready, Ready, Run, Error):

LEDs are lighting or climbing as on the GC.

The GC connection state: connected or not connected:

The GC state or analysis phase: Ready, Equilibrating, Stabilizing, Pre-Run, Sample Prep, Running, Fault: For example:

The GC oven current temperature:

The running acquisition time and the total time: 

Note that during the stabilizing phase, the running time is displayed in Yellow not in Blue. Clicking on the clock displays the remaining time instead of the current acquisition time.

Not Ready Tab*:* contains the not ready information sent by the GC.

Events Tab: contains the events that have occurred on the instrument.